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NUMERICAL FORECASTING OF
CLEAR AIR TURBULENCE

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NUMERICAL FORECASTING OF

CLEAR AIR TURBULENCE

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ABSTRACT

There is much disagreement as to (a) what causes clear air turbulence (turbulence which is not in or near convective clouds and is above 15,000 feet in altitude) and (b) which meteorological parameters can be used to detect and forecast its occurrence. The approach to this problem has been to relate not one parameter to clear air turbulence but various parameters. By summing these parameters areas can be defined where there is a high probability of encountering clear air turbulence. Each parameter has been based on a statistical study which found a relationship with clear air turbulence. The parameters used were horizontal and vertical shear, curvature, kinetic energy and their derivatives.

The numerical forecasting program proposed here can be extended to the stratosphere when more reliable height and temperature fields are available. This program will have much more significance when intermediate forecast height fields, temperature fields and a grid of much smaller mesh length are available.

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1. INTRODUCTION

The phenomenon of clear air turbulence (henceforth denoted as CAT) appears to consist of random three dimensional eddies that occur in certain confined regions of the atmosphere. This phenomenon was first recognized in the early 1940's as "air pockets", and has gained in importance and depth of study with the development of fast-flying swept wing and delta winged aircraft. It is of prime importance to the aviation industry because it affects the safety and comfort of passengers and crew, as well as operational costs. There have been several cases where loss of control of aircraft, structural damage, passenger and crew injuries (even deaths) have resulted from CAT.

Aircraft manufacturers and the airlines are interested in CAT in order to determine the strength of airframe design so that it can be built to withstand all degrees of turbulence. Planning of supersonic transport aircraft is considering the effects of this unexpected turbulence occurring at any flight level in the atmosphere. Therefore, it becomes an even greater operational problem in the era of future design of SST aircraft as to cost, safety and comfort. CAT is usually less intense than turbulence encountered in thunderstorms 1 . CAT may be considered at times more dangerous than "thunderstorm turbulence" as it usually occurs with no visible warning.

The various military agencies are deeply concerned with the understanding of CAT and its prediction so they may be better prepared to take it into account operationally in all areas of the world. Scientists are highly interested in CAT because it is a phenomenon of our environment that is not clearly understood. We are faced with the problem of having to rely on mesoscale data while the phenomenon is of a microscale. Because of the great differences in scales involved in the forecasting

problem, isolated patches of CAT (in either space or time) are very difficult to identify. It is the intent of this paper to develop a numerical forecasting system of CAT whereby an empirical approach has been used to accomplish this end.

2. DATA COLLECTION

The nature of clear air turbulence, its physics and its meteorology, are still not completely understood. More mesoscale (2km to 100km horizontal distance) and microscale (less than 2km) studies must be made concerning the causes and generation of CAT. Any improvement in forecasting skill that may be realized by this study will probably result from increased mesoscale input data into the forecast problem. The only mesoscale measurements available operationally at this time which concern the problem are rawinsonde data that give a nearly continuous measurement in the vertical of wind, pressure, temperature and humidity from the surface to above 30km in altitude, and satellite cloud pictures that delineate cloud structures down to a scale of about 3km.

The usual definition of CAT is "atmospheric turbulence which is not in or near convective clouds, including thunderstorms, and is not below 15,000 feet in altitude". (4) Thus, mechanical turbulence induced by rough terrain is excluded. It is realized that this is an extremely arbitrary definition resulting from a desire to simplify pilot reporting procedures.

Turbulence intensities are, at present, designated as light, moderate, severe and extreme. In recent years several definitions of the four categories of turbulence have been proposed. The current definitions in official use were developed by the National Advisory Committee for Aeronautics (NACA) Subcommittee on Meteorological Problems (1957). See Table 1.

There are few quantitative measurements of atmospheric turbulence at any scale. The bulk of the aircraft turbulence data available is based upon the four categories stated in Table 1, (4) ; and, consequently is highly subjective and qualitative in nature. Included in the factors that affect the subjective decision of the pilot when reporting turbulence are the wing loading, the aircraft's speed and attitude, the pilot's training, experience, and his psychological reactions (1) .

Objective criteria for turbulence reporting must wait until more measurements are made of the conditions existing in the turbulent eddies, and until cockpit instrumentation includes a gust load or turbulence indicator.

Much time, effort and financial support have been expended in this country by the government, the aircraft industry, and private and public research facilities to investigate the problem of clear air turbulence and to find a good approach leading to a solution to this problem. This research has gone forward in three broad categories: first, research concerning the correlation of CAT with macroscale, mesoscale, and/or microscale atmospheric measurements; second, research into instrumentation for the detection of CAT sufficiently far in advance of the aircraft to allow evasive measures (6) and third, research by military and airline organizations concerning the operational aspects of CAT.

Various projects such as HICAT, ALLCAT, and TOPCAT have been undertaken to study clear air turbulence. The problems encountered were many but the results showed that it was indeed possible, with suitable instrumentation, to find, track and record CAT. The use of constant level balloons and doppler radar to detect CAT has met with some success, but again the lack of detail necessary in CAT studies leaves much to be desired.

Measurements of the microstructure, which contains the perturbations of CAT dimensions (100 to 500 meter wavelength), have been taken by specially instrumented aircraft. Until recently the aircraft itself was used as a sensor to measure atmospheric gusts from the aircraft acceleration data. The Air Force realized the danger of relying solely on the acceleration response of the U-2 aircraft as a measure of turbulence at high altitudes. A full knowledge of the aircraft's response to turbulence over a wide range of wavelengths is required for meaningful interpretation of such data. This procedure usually gives reliable results at short wavelengths up to a few hundred meters. At long wavelengths, this instrumentation becomes less sensitive. Accelerations in longer waves are usually small and can be masked by pilot induced aircraft motions.

A supersonic or hypersonic craft of some radical shape, flying four to ten times the speed of the U-2, will obviously have a somewhat different response to turbulence than the U-2. An aircraft flying at these high speeds would be affected much more by longer turbulence wavelengths and less by the shorter.

As pointed out earlier, the meteorologist has few direct measurements of turbulence intensities and must depend upon the accuracy of the intensities reported by pilots. In our study, we used the Colson monthly turbulence summaries which were obtained from the Air Force 3rd Weather Wing at Offutt AFB, Omaha, Neb. This report suited our needs most closely because the CAT reports were detailed as to location, time, altitude and intensity. In the period used in our study, December 1964 through March 1965, there were no less than 3670 CAT reports. The

reports were located over the United States and extended from about 15,000 feet to over 45,000 feet. The data were collected from military, civilian and private aircraft. They are, as mentioned before, quite subjective.

In the course of this paper three time periods or intervals will be used. It is important to establish at this point which periods were used and for what purpose.

A four month period (December 1964 through March 1965) is used for the research program during which several fields were constructed. Patterns of fields of different meteorological parameters were sometimes similar. Then all but one of them were dropped in our further investigations. In this way only three of the original seven parameters were retained.

The three day period (10 - 12 March, 1965) was used for a verification or correlation study. During this period of time a comparison was made to find out how many times CAT actually occurred in areas where it was predicted.

Finally, 23 February 1965 was arbitrarily chosen from the four month period and used only for illustrating the various fields and parameters used in the research program.

3. THE CLEAR AIR TURBULENCE STUDY

Clear air turbulence (CAT) is a microscale phenomenon (less than 2 kilometers in horizontal extent) but the conditions which are symptomatic of its existence are of synoptic scale. Therefore, synoptic scale parameters may be used to determine areas where CAT could occur, that is forecasting areas where there is a high probability of CAT.

From various reports and their contradictions it appears that no single parameter can detect CAT. Certain parameters can detect the possibility of CAT in some synoptic situations but fail in others.

The approach used in this paper was to take statistical studies made by previous investigators and to use the basic parameters which they related to CAT (2,3,5,7,8). If the magnitude of any one parameter becomes large or the sum of various parameters becomes large then there is a high probability of CAT in that area. Therefore, the problem is not one of forecasting actual CAT but rather to forecast areas of high and low probability of encountering CAT. In this way flights may be planned so as to expect least CAT.

The research program consisted of computing the equations shown in Appendix A. These equations were computed using the CDC 1604 digital computer. The program was written utilizing symbolic coded relocatable assembly program (SCRAP). It was necessary to use fixed point fractional numbers in order that Fleet Numerical Weather Facility (FNWF) subroutines could be used. All finite differences were computed using standard FNWF mesh length of 381 kilometers true at 60 degrees north latitude. There are no time derivatives in the program. The research reported here is accomplished using analytical fields. Operational use would employ

forecast fields. Results would naturally not have been as good if forecast fields were used in this research. "Prog 24 hours" printed at the bottom of each field represents the practical forecast interval to be used operationally.

The research program was written to compute CAT in three layers 500 to 300, 300 to 200, and 200 to 100 millibars. Computations were not made for the third layer since 100 millibar fields were not available.

The research program was written to compute on the entire 63 x 63 FNWF grid of the northern hemisphere. A boundary condition of zero was used for the outside rows and columns. The print routines are 22 x 22 extracts of the United States starting at FNWF grid point J008, I018. The latitude and longitude coordinates of the four corners of the printed fields starting with the lower left corner proceeding clockwise are: 9.1N 109.5W, 44.5N 165.5W, 57.7N 3.1E, 13.0N 58.8W.

All printed fields are pure numbers and have no dimensional meaning. All scaled outputs have been shifted to the left end of the register and the first three numbers with sign bit are printed out in decimal. Grid points can take on values from -999 to +999 except those fields which have been made all positive. The decimal point does not appear on the printed fields. Therefore, the printed grid point values are from -999 to +999.

In the research program the capital letters refer to the parameter as computed from the data. The small case letters serving as exponents represent the number of times and direction the register has to be shifted in order to place the significant portion into the first three numbers. Therefore, the two with exponents represent the scaling coefficient. Since the computations were in fixed point fractional all

printouts had to be shifted so as not to exceed one at any grid point in the field. Exceeding one would result in a meaningless value at that particular grid point. In addition the entire field had to be kept large enough so that patterns could exist and not be at or near zero throughout the field. Since these fields are summed they must be small enough so as not to cause the summation field to exceed one at any grid point.

The research program was run for thirty-six days during December 1964 and January, February, and March 1965. The thirty-six days were chosen because they were the most active in CAT reports during the four month period. In other words, there were more reports by pilots encountering CAT on these particular days. In order to show an example of each field printed out by the research program the time 00Z 23 FEB 65 was arbitrarily selected. These fields appear in Appendix C. Each field was produced by an individual term which will be described as follows:

THE FIRST TERM OF THE RESEARCH PROGRAM (APPENDIX A)

The First Term is $2^a A$ where A is the Laplacian of absolute vorticity. When this term is negative there is a local maximum of absolute vorticity meaning it is larger at that grid point than the average of the surrounding grid points. Therefore, the cyclonic curvature or cyclonic shear or both are relatively large at that grid point. This should correspond to the cold side of the jet especially in troughs. According to Endlich and McLean (1) there is a greater percentage of CAT on the cold side of the jet. Also according to Harrison (2) there is a strong tendency for moderate to severe CAT to be associated with trough lines.

This term was computed for the layer by first calculating the absolute vorticity of the upper and lower level D fields. The Laplacian was then taken of each field and a vertical average made of the upper and lower levels to obtain the Laplacian of vorticity of the layer.

This parameter has depicted most of the CAT associated with the trough over the western United States. The severe CAT near New Orleans is in an area of very large negative numbers. The field is contoured at intervals of 100 with the origin at zero.

THE SECOND TERM

The Second Term is $2^b B$ where B is the absolute value of the vertical change in the vector thermal wind. One of the parameters which Lake's (7) statistical testing indicated was associated with CAT was the vertical gradient of wind shear. As shown by Richardson (9) the thermal wind shear is proportional to the gradient of static stability.

The u and v components of the thermal wind were computed from the upper and lower level temperature fields. The difference between the upper and lower level values of the u component was found and each difference was squared. This was also done for the v component. The square root of the sum of the squared differences gives the magnitude of the vector difference. According to Endlich and McLean (3) the largest values of the thermal wind shear appear on the warm side of the jet. This was found to be true throughout the four months. The contour interval for this field is 25 and the origin is zero.

THE THIRD TERM

The Third Term is $2^c C$ where C is one half the geostrophic wind velocity squared. C therefore represents the specific kinetic energy or in other words the kinetic energy per unit mass.

Clem (2) found that most cases of moderate to severe CAT were associated with areas of isotach maxima.

This term was computed for the layer by calculating the u and v components of the geostrophic wind at the upper and lower levels. The upper and lower level u components were vertically averaged to obtain an average u component for the layer. The average v component for the layer was obtained by a similar process. The magnitude of the velocity squared is just the sum of the squared components.

In the research program this field is contoured at intervals of 100 with the origin at zero. Contoured at this interval the kinetic energy field clearly depicts the isotach maxima regions. The kinetic energy field in Appendix C shows this field depicting the CAT in the western part of the United States occurring in areas of relatively large wind speeds. The kinetic energy field fails to indicate the severe CAT near New Orleans because it occurs in an area of relatively light winds.

THE FOURTH TERM

The Fourth Term is $2^d D$ where D is the absolute value of the derivative of the kinetic energy with respect to pressure.

Lake's (7) statistical testing indicated that the gust intensities are related to the vertical gradients of horizontal kinetic energy. This term was computed for the layer by first calculating the velocity squared at the upper and lower levels. The vertical gradient for the layer was then obtained by computing the difference between the upper and lower level values of the velocity squared. The absolute value was taken so as to have all values positive. CAT should be associated with

large values of this field. Large values of this field were found only in areas of large values of kinetic energy. This field was therefore redundant and was eliminated from the CAT forecast program. The contour interval was 100 with the origin at zero.

THE FIFTH TERM

The Fifth Term is $2^e E$ where E is the absolute value of the Laplacian of kinetic energy. The statistical survey made by Endlich and McLean (3) shows the maximum occurrence of CAT along the edges of the isotach maxima. The Laplacian of kinetic energy shows large horizontal changes in kinetic energy, both positive and negative. Therefore the absolute value of the term is taken in order to give only positive numbers. The contour interval was 25 with the origin at zero.

This term was introduced to depict the areas of large horizontal change in kinetic energy. However, there was no relationship with reported CAT. This field was therefore eliminated from the CAT forecast program.

THE SIXTH TERM

At this point in the research program it was necessary to sum the first five terms due to computer memory space. This term, referred to as KAT1, was the Sixth Term. The contour interval was 250 with the origin at zero. It was found that this term did not supply significantly new information since it was dominated by the kinetic energy and the two associated terms.

THE SEVENTH TERM

The Seventh Term is $2^f F$ where F is the Jacobian of temperature and omega (component of the wind normal to the pressure surface). This

term was developed by Dr. Moore of Douglas Aircraft and Dr. Krishnamurti (8). The latter was associated at that time with the University of California, Los Angeles and consultant to Douglas Aircraft. The term was developed as the Jacobian of temperature and three dimensional divergence. As shown in their paper this is proportional to the negative of the Jacobian of temperature and omega. This term was computed for the lower level of each layer in the research program. The contour interval for this term was 100 with the origin at zero. In this program no significant relationship was found with large negative or positive numbers over the four month period. This term was therefore eliminated from the CAT forecast program.

THE EIGHTH TERM

The Eighth Term is $2^8 G$ where G is the absolute value of horizontal divergence. It was computed by taking the derivative of omega with respect to pressure. As previously stated the entrance and exit regions of isotach maxima areas have been found to be associated with CAT. These areas are also associated with horizontal convergence at the entrance and divergence at the exit regions. Therefore the absolute value of the change in omega with pressure represents the convergence and divergence in the layer parallel to the pressure surfaces.

This term was computed by subtracting the lower level omega value from the upper level omega value at each grid point. Areas of convergence and divergence of the height field are quite vividly depicted by the divergence field. No significant relationship was found between the divergence field and the CAT occurrences, therefore, it was eliminated from the CAT forecast program.

THE NINTH TERM

The Ninth Term was KAT2, the summation of all previous terms. No significant relationship was found with CAT occurrences since several terms tended to cancel each other out.

The program then goes into the second layer from 300 to 200 millibars. All terms were computed and scaled the same, except the divergence term. It could not be computed because the 200 millibar omega field was not available.

The third layer from 200 to 100 millibars could not be run for these time periods since the 100 millibar fields were not available. There were very few CAT reports above 200 millibars, therefore, the loss was insignificant.

In all three layers the lower level height field is printed out first. This gives a general impression of the synoptic situation and renders more significance to the patterns developed in the other fields. The contour interval for the 500 millibar field is 60 meters with the origin at 5580 meters. The contour interval for the 300 millibar field is 120 meters with the origin at 9120 meters. The contour interval for the 200 millibar field is 120 meters with the origin at 11,760 meters.

The CAT forecast program appears in Appendix D. The first three terms of the research program are used with minor changes. In the first term "a" is changed to minus one and the contour interval has been changed to 150 to give better defined patterns. The second term has been used unchanged. The third term is unchanged except for the contour interval which was changed to 50 to increase the pattern size. The KAT field itself is the summation of these three terms and gives quite reasonable patterns and pattern sizes.

The pattern area depicting a high probability of CAT would necessarily be larger during a more active CAT period. The most active part of the year was the four month period December 1964, January, February, and March 1965. During these months the most active three day period was the tenth through the twelfth of March 1965. Therefore the KAT fields have quite large pattern sizes in Appendix E since they represent the most active three days of the year. The KAT field patterns were smaller for less active periods. The total area covered by these patterns is much less in the KAT field than in the other three parameter fields.

This is exactly what was attempted in order to obtain optimum size of the forecasted danger areas. If the KAT field patterns are too large, flights will be rerouted unnecessarily. On the other hand, if the KAT field patterns are too small, there is a real danger of CAT occurring outside these areas. Therefore, the restraint of the KAT field patterns is necessary in order to have an operationally useable product.

4. DISCUSSION AND RECOMMENDATION FOR FUTURE STUDIES

The period used in this paper was chosen because of the largest number of reported CAT occurrences. Of the four month period (December 1964, January, February and March 1965) there were scattered periods where a large number of occurrences were reported. This four-month period was used to determine which parameters were best suited for forecasting purposes. The three-day period of 10-12 March 1965 was selected for a correlation study in order to find out how successful our forecast method is. Tables 2, 3, and 4 show the various fields used and the resultant KAT field for the 10th, 11th and 12th of March 1965.

The use of the term "percent correlation" as used in this study does not mean to imply a statistical correlation. The ideal forecast verification makes use of those cases where CAT is forecast, but does not occur, and where CAT is not forecast and does not occur. In our study it was impossible to take those cases quantitatively into account. Therefore, it is to be understood that "correlation" as used in this study was a general comparison of those reported CAT occurrences that fell within the delineated area of high probability of CAT against those that did not. For example, if there were ten reported CAT occurrences for a given layer and time period and six of these reports fell inside or on the line delineating the CAT area and four reports fell outside the area, then for that field, layer and time period we would list it as six occurrences correlated or a sixty percent correlation.

Listed are the names of the fields, the number of occurrences of CAT for each field and the percent correlation by field. Also shown are the number of occurrences and the number of occurrences that correlated by field and CAT intensity.

After combining the Laplacian of Vorticity, Vertical Gradient of Thermal Wind and Kinetic Energy we arrive at the KAT Field which is our end product for the area of high probability of CAT occurrences. Even though a higher correlation may be seen in some fields other than the KAT field, one should realize that these fields encompassed a larger than average area. In such cases one must expect a high correlation.

The high correlation is then not due to the finesse of the forecast method, but rather due to the fact that for most of the USA there was a forecast of high probability for CAT. Theoretically, it would be a good idea to divide the percent correlation (such as we computed) by the size of the area for which CAT was forecasted. We did not follow this idea quantitatively, but only qualitatively. Therefore, one finds that the percent correlation for our ultimate forecast (labeled KAT) is sometimes lower than the percent correlation for one of the three separate forecasting fields.

Table 5 is a summary for the three day period. It shows the total number of CAT occurrences by turbulence category, percent correlation by field and turbulence category, and the three day percent correlation by field.

The results were most encouraging and we feel that our end product was a substantial step in at least the right direction toward forecasting clear air turbulence. Our knowledge of the meso- and micro- structure of flow patterns in the free atmosphere, especially above the tropopause, is still rather poor. A strong need still exists for a well organized and well equipped measurement program, especially at flight levels of the future supersonic transport aircraft. Measurement programs using

methods of data collection other than aircraft should be sought in order to obtain more information on the real micro- structure of the atmosphere, without the large disturbances which a flying aircraft will create itself.

Case studies of CAT occurrences so far were limited to a comparison of turbulence location with atmospheric parameters measured as closely as possible to the time of occurrence. We might gain some additional information on the physical causes of CAT if the development and previous history of flow patterns bearing CAT were studied.

There still exists a need for sensitive, accurate and compact instrumentation, especially an accelerometer which measures and records the three components of gustiness separately and simultaneously.

In summarizing we would like to state that turbulence research in the free atmosphere has come a long way, especially when we consider the fact that measurements are most difficult to duplicate in controlled experiments. We need the free atmosphere above us to conduct our research, and this same atmosphere has an infinite choice of parameter combinations. This should provide the seed of interest to combine the efforts of physics, aerodynamics, mathematics, statistics and meteorology to seek out and find a more complete and more satisfying solution of the problem.

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6. APPENDIX A
EQUATIONS

The numbers in parentheses on this and the following pages refer to the page numbers in the text where each item is discussed.

The numbers below each term in the following two equations identify the number of each term (e.g., KAT1 is the sixth term).

THE RESEARCH PROGRAM (p. 15)

$$\begin{array}{cccccc} \text{KAT1} = 2^{\text{a}}\text{A} - 2^{\text{b}}\text{B} - 2^{\text{c}}\text{C} - 2^{\text{d}}\text{D} - 2^{\text{e}}\text{E} & & \text{KAT2} = \text{KAT1} - 2^{\text{f}}\text{F} - 2^{\text{g}}\text{G} \\ 6 & 1 & 2 & 3 & 4 & 5 & 9 & 6 & 7 & 8 \end{array}$$

THE FIRST TERM 2^{a}A (p. 15)

$$a = 0 \quad A = \nabla^2 \eta \quad \eta_0 = f + \frac{g}{fd^2} [Z_1 + Z_2 + Z_3 + Z_4 - 4Z_0]$$

$$\nabla^2 \eta_0 = \frac{1}{d^2} [\eta_1 + \eta_2 + \eta_3 + \eta_4 - 4\eta_0] \quad \nabla^2 \eta = 1/2 [\nabla^2 \eta_u + \nabla^2 \eta_L]$$

THE SECOND TERM 2^{b}B (p. 16)

$$b = 0 \quad B = \left| \frac{\vec{\Delta \vec{t}}}{\Delta P} \right|$$

$$U_t = \frac{-g}{fT} \frac{[T_2 - T_4]}{2d} \quad V_t = \frac{g}{fT} \frac{[T_3 - T_1]}{2d} \quad \vec{V}_{t_u} = U_{t_u} i + V_{t_u} j$$

$$\vec{V}_{t_L} = U_{t_L} i + V_{t_L} j \quad \frac{\Delta \vec{V}_t}{\Delta P} = \frac{\vec{V}_{t_L} - \vec{V}_{t_u}}{\Delta P} = \frac{[U_{t_L} i + V_{t_L} j]}{\Delta P} - \frac{[U_{t_u} i + V_{t_u} j]}{\Delta P}$$

$$\frac{\Delta \vec{V}_t}{\Delta P} = \frac{[U_{t_L} - U_{t_u}]}{\Delta P} i + \frac{[V_{t_L} - V_{t_u}]}{\Delta P} j = \frac{\Delta U_t}{\Delta P} i + \frac{\Delta V_t}{\Delta P} j$$

$$\left| \frac{\Delta \vec{V}_t}{\Delta P} \right| = \left(\frac{\Delta U_t}{\Delta P} \right)^2 + \left(\frac{\Delta V_t}{\Delta P} \right)^2$$

THE THIRD TERM 2^c (p. 16)

$$c = 0 \quad C = \frac{\bar{\vec{V}}^2}{2}$$

$$U_g = \frac{-g}{f} \frac{[Z_2 - Z_4]}{2d}$$

$$V_g = \frac{g}{f} \frac{[Z_3 - Z_1]}{2d}$$

$$\bar{U}_g = \frac{U_{g_u} + U_{g_L}}{2}$$

$$\bar{V}_g = \frac{V_{g_u} + V_{g_L}}{2}$$

$$\bar{\vec{V}}_g = \bar{U}_g i + \bar{V}_g j$$

$$\bar{\vec{V}}_g^2 = (\bar{U}_g)^2 + (\bar{V}_g)^2$$

THE FOURTH TERM 2^d (p. 17)

$$d = 1 \quad D = \left| \frac{\Delta \bar{\vec{V}}^2}{\Delta P} \right|$$

$$\frac{\Delta \bar{\vec{V}}^2}{\Delta P} = \frac{\bar{\vec{V}}_L^2 - \bar{\vec{V}}_u^2}{\Delta P}$$

$$\left| \frac{\Delta \bar{\vec{V}}^2}{\Delta P} \right| = \sqrt{\left(\frac{\Delta \bar{\vec{V}}^2}{\Delta P} \right)^2}$$

THE FIFTH TERM 2^e (p. 18)

$$e = 1 \quad E = \left| \nabla^2 \frac{\bar{\vec{V}}^2}{2} \right|$$

$$\nabla^2 \bar{\vec{V}}_0^2 = \frac{1}{d^2} [\bar{\vec{V}}_1^2 + \bar{\vec{V}}_2^2 + \bar{\vec{V}}_3^2 + \bar{\vec{V}}_4^2 - 4\bar{\vec{V}}_0^2] \quad \left| \nabla^2 \bar{\vec{V}}_0^2 \right| = \sqrt{(\nabla^2 \bar{\vec{V}}_0^2)^2}$$

THE SIXTH TERM (p. 18)

$$KAT1 = \nabla^2 \eta - \left| \frac{\Delta \vec{V}}{\Delta P} \right| - \frac{\bar{\vec{V}}^2}{2} - \left| \frac{\Delta \bar{\vec{V}}^2}{\Delta P} \right| - \left| \nabla^2 \frac{\bar{\vec{V}}^2}{2} \right|$$

THE SEVENTH TERM 2^f (p. 18)

$$f = 11 \quad F = J[T, \omega]$$

$$J[T, \nabla_3 \cdot \vec{V}] = \frac{-1}{\gamma P} J[T, \omega]$$

$$J[T, \omega] = \frac{1}{4d^2} [(T_3 - T_1)(\omega_2 - \omega_4) - (T_2 - T_4)(\omega_3 - \omega_1)]$$

THE EIGHTH TERM 2^g (p. 19)

$$g = 13 \quad G = \left| \frac{\Delta \omega}{\Delta P} \right|$$

$$\frac{\Delta \omega}{\Delta P} = \frac{1}{\Delta P} [\omega_L - \omega_u] \quad \left| \frac{\Delta \omega}{\Delta P} \right| = \frac{1}{\Delta P} \sqrt{(\omega_L - \omega_u)^2}$$

THE NINTH TERM (p. 20)

$$\text{KAT2} = \text{KAT1} + 2^{11} J[\text{T}, \omega] - 2^{13} \left| \frac{\Delta \omega}{\Delta \text{P}} \right|$$

PROG KAT PROGRAM (p. 20)

$$\text{KAT} = 2^{-1} \nabla^2 \eta - \left| \frac{\Delta \vec{\text{VT}}}{\Delta \text{P}} \right| - \frac{\vec{\text{V}}^2}{2}$$

7. APPENDIX B

THE RESEARCH COMPUTER PROGRAM

NOBGAH

0062	75 4 0114 50 0 0000	+	RTJ	LAPLAC2	COMPUTES LAPLACIAN OF LOWER LEVEL VORTICITY FIELD STOMS IN FSI
00621	75 4 01122 50 0 0000	+	RTJ	HORIZ	COMPUTES AVERAGE VORTICITY BETWEEN UPPER AND LOWER LEVELS STOMS IN FS5
00622	75 4 01473 50 0 0000	+	RTJ	PRINT1	STOMS SCALED MAP FACTOR IN FS6
00623	75 4 01027 50 0 0000	+	RTJ	PHAT	COMPUTES U COMPONENT OF THERMAL WIND AT LOWER LEVEL STOMS IN FS0
00624	75 4 01035 50 0 0000	+	RTJ	UTHM1	COMPUTES U COMPONENT OF THERMAL WIND AT LOWER LEVEL STOMS IN FS1
00625	75 4 01053 50 0 0000	+	RTJ	UTHM2	COMPUTES U COMPONENT DIFFERENCE BETWEEN UPPER AND LOWER LEVELS STOMS IN FS0
00626	75 4 01071 50 0 0000	+	RTJ	DUTHM	COMPUTES V COMPONENT OF THERMAL WIND AT LOWER LEVEL STOMS IN FS1
00627	75 4 01076 50 0 0000	+	RTJ	VTHM1	COMPUTES V COMPONENT OF THERMAL WIND AT UPPER LEVEL STOMS IN FS2
00630	75 4 01114 50 0 0000	+	RTJ	VTHM2	COMPUTES V COMPONENT DIFFERENCE BETWEEN UPPER AND LOWER LEVELS STOMS IN FS1
00631	75 4 01132 50 0 0000	+	RTJ	DVTHM	COMPUTES VERTICAL GRADIENT OF THERMAL WIND STOMS IN FS0
00632	75 4 01137 50 0 0000	+	RTJ	DTHM	HORIZ MINUS DTHM STOMS IN FS5
00633	75 4 01517 50 0 0000	+	RTJ	PPINT2	SEE ABOVE
00634	75 4 01147 50 0 0000	+	RTJ	KAT1	SEE ABOVE
00635	75 4 00720 50 0 0000	+	RTJ	READD2	SEE ABOVE
00636	75 4 02726 50 0 0000	+	RTJ	UNPKCD2	SEE ABOVE
00637	75 4 00705 50 0 0000	+	RTJ	READD1	SEE ABOVE
00640	75 4 00713 50 0 0000	+	RTJ	UNPKCD1	SEE ABOVE
00641	75 4 00761 50 0 0000	+	RTJ	REWIND	REWINDS TU 3 CH 5/6
00642	75 4 00765 50 0 0000	+	RTJ	REWIND1	

00643	75 4 00771 50 0 00000	+	RTJ	SINF	SEE ABOVE
00644	75 4 01027 50 0 00000	+	RTJ	MHAT	SEE ABOVE
00645	75 4 01154 50 0 00000	+	RTJ	UGE0S1	COMPUTES U COMPONENT OF GEOSTROPHIC WIND AT UPPER LEVEL STOWS IN FS2
00646	75 4 01172 50 0 00000	+	RTJ	UGE0S2	COMPUTES U COMPONENT OF GEOSTROPHIC WIND AT LOWER LEVEL STOWS IN FS3
00647	75 4 01210 50 0 00000	+	RTJ	UGE0S	COMPUTES AVERAGE U COMPONENT STOWS IN FS2
00650	75 4 01217 50 0 00000	+	RTJ	VGE0S1	COMPUTES V COMPONENT OF GEOSTROPHIC WIND AT UPPER LEVEL STOWS IN FS3
00651	75 4 01235 50 0 00000	+	RTJ	VGE0S2	COMPUTES V COMPONENT OF GEOSTROPHIC WIND AT LOWER LEVEL STOWS IN FS3
00652	75 4 01253 50 0 00000	+	RTJ	VGE0S	COMPUTES AVERAGE V COMPONENT STOWS IN FS3
00653	75 4 01262 50 0 00000	+	RTJ	KINETIC	COMPUTES V SQUARE STOWS IN FS0 COMPUTES V SQ DIFF STOWS IN FS4
00654	75 4 01567 50 0 00000	+	RTJ	PRINT4	
00655	75 4 01613 50 0 00000	+	RTJ	PRINT5	
00656	75 4 01274 50 0 00000	+	RTJ	LAPKIN	COMPUTES LAPLACIAN OF KINETIC ENERGY STOWS IN FS6
00657	75 4 01637 50 0 00000	+	RTJ	PRINT6	
00660	75 4 01306 50 0 00000	+	RTJ	KAT2	STOWS PREVIOUS TERMS IN FS0
00661	75 4 01663 50 0 00000	+	RTJ	PRINT7	
00662	75 4 00746 50 0 00000	+	RTJ	READT2	SEE ABOVE
00663	75 4 00754 50 0 00000	+	RTJ	UNPCKT2	SEE ABOVE
00664	75 4 00761 50 0 00000	+	RTJ	REWIND	REWINDS TU 3 CH 5/6
00665	75 4 01327 50 0 00000	+	RTJ	READ02	READS OMEGA FIELD INTO FS4
00666	75 4 01335 50 0 00000	+	RTJ	UNPCK02	UNPACKS LOWER LVL OMEGA INTO FS6

MORGA

00667	75 4 00765 50 0 00000	+	RTJ	RWIND1	REWARDS TL2 CH 5/6
00670	75 4 01842 50 0 00000	+	RTJ	MUORE	COMPUTES THE JACOBIAN OF TEMPERATURE AND OMEGA STOWS IN FS1
00671	75 4 01814 50 0 00000	+	RTJ	READ01	READS OMEGA FIELD INTO FS4
00672	75 4 01822 50 0 00000	+	RTJ	UNPCK01	UNPACKS UPPER LVL OMEGA INTO FS5
00673	75 4 00765 50 0 00000	+	RTJ	RWIND1	
00674	75 4 01355 50 0 00000	+	RTJ	HURDV6	COMPUTES HORIZONTAL DIVERGENCE STOWS FS5
00675	75 4 01365 50 0 00000	+	RTJ	ABSDIV	COMPUTES ABSOLUTE DIVERG STOWS IN FS5
00676	75 4 01707 50 0 00000	+	RTJ	PRINTP	
00677	75 4 01543 50 0 00000	+	RTJ	PRINTP	
00700	75 4 01873	+	RTJ	KAT	COMPUTES VORTICITY DIFFERENCE PLUS THERMAL WIND DIFFERENCE PLUS KINETIC ENERGY DIFFERENCE PLUS THE CHANGE IN KINETIC ENERGY PLUS KINETIC ENERGY PLUS THE DIVERGENCE
00701	50 0 00000 75 4 01663 50 0 00000	+	RTJ	PRINT7	
00702	75 4 01400 50 0 00000	+	RTJ	LAYER2	COMPUTES 300 TO 200 MB LAYER
00703	75 4 01424 50 0 00000	+	RTJ	LAYER3	COMPUTES 200 TO 100 MB LAYER
00704	75 4 00000 50 0 00000	+	SLS		END OF STEERING PROGRAM USES OFF LINE PRINTING
00705	75 4 00000 50 0 00000	+	READD1	SLJ **	
00706	75 4 02001 50 0 01735	+	LOA ELC	TIME TABLE1	
00707	75 4 04231 50 0 00000	+	RTJ SLS	MAG 0,0	
00710	50 0 02014 50 0 01300	+	ENI INI	MAA 1300B	
00711	50 0 44215 50 0 02007	+	ENI INI	FS4 READERR	
00712	75 4 00705 50 0 00000	+	SLJ	READD1	
00713	75 4 00000 50 0 00000	+	UNPCK 1 SLJ INI	** 0,6	

MURCA

00714	75 0 00716 50 0 44215	+	SLJ 00	**2 FS4
00715	75 0 05015 50 0 02453		FS4 2453B	
00716	75 0 04715 50 0 00007	+	RTJ FNI	WAB 7
00717	75 0 00713 50 0 00000		SLJ	UNPCKD1
00720	75 0 00000 50 0 00000	READD	SLJ	**
00721	12 0 02001 16 0 01743	+	LDA LDD	TIME NAME2
00722	75 0 04231 50 0 00000	+	RTJ 00	MAG 0,0
00723	50 0 02014 50 0 01300		FNI FNI	MAA 1300B
00724	50 0 44215 50 0 02007		FNI FNI	FS4 READER
00725	75 0 00720 50 0 00000		SLJ	READD2
00726	75 0 00000 50 0 00000	UNPCKD2	SLJ FNI	** 0,6
00727	75 0 00731 50 0 44215	+	SLJ 00	**2 FS4
00730	50 0 14055 50 0 02453		00 00	FS1 2453B
00731	75 0 04715 50 0 00007	+	RTJ FNI	WAB 7
00732	75 0 00726 50 0 00000		SLJ	UNPCKD2
00733	75 0 00000 50 0 00000	READT1	SLJ	**
00734	12 0 02001 16 0 01743	+	LDA LDD	TIME NAME3
00735	75 0 04231 50 0 00000	+	RTJ 00	MAG 0,0
00736	50 0 02014 50 0 01300	HIGHT	FNI FNI	MAA 1300B
00737	50 0 44215 50 0 02007		FNI FNI	FS4 READER
00740	75 0 00733 50 0 00000		SLJ	READT1
00741	75 0 00000 50 0 00000	UNPCKD1	SLJ FNI	** 0,6
00742	75 0 00744 50 0 44215	+	SLJ 00	**2 FS4
00743	50 0 24015 50 0 02453		00 00	FS2 2453B

S.P.A

00744	75 0 04715 50 0 00000	+	RTJ FNI	WAB 7
00745	75 0 00741 50 0 00000		SLJ	UNPKCT1
00746	75 0 00000 50 0 00000	READT2	SLJ	**
00747	12 0 02001 16 0 01746	+	IPA LDG	TIME NAME4
00750	75 4 04231 50 0 00000	+	RTJ FNI	MAG 0,0
00751	50 0 02014 50 0 01300		FNI	MAA 13008
00752	50 0 44215 50 0 02007		FNI	FS4 READERR
00753	75 0 00746 50 0 00000		SLJ	READT2
00754	75 0 00000 50 0 00000	UNPKCT2	SLJ FNI	** 0,6
00755	75 0 00757 50 0 44215	+	SLJ FNI	**2 FS4
00756	50 0 34355 50 0 02453		SLJ	FS3 24538
00757	75 4 04715 50 0 00007	+	RTJ FNI	WAB 7
00760	75 0 00754 50 0 00000		SLJ	UNPKCT2
00761	75 0 00000 50 0 00000	REWIND	SLJ	**
00762	75 4 02014 50 0 11456	+	RTJ FNI	MAA 11306R
00763	75 0 00761 50 0 00000	+	SLJ	REWIND
00764	75 0 02013 50 0 00000	+	SLJ	WINDERR
00765	75 0 00000 50 0 00000	REWIND1	SLJ	**
00766	75 4 02014 50 0 11206	+	RTJ FNI	MAA 11206P
00767	75 0 00765 50 0 00000	+	SLJ	REWIND1
00770	75 0 02013 50 0 00000	+	SLJ	WINDERR
00771	75 0 00000 50 0 00000	SINF	SLJ	**
00772	75 4 04535 50 0 44215	+	RTJ FNI	SAI FS4
00773	75 0 00771 50 0 00000	+	SLJ	SINF

PAGE

00774	75 0 0000 50 0 0000					**
00775	75 4 04611 50 0 44215	+		SLJ	PTJ FNI	SAR FS4
00776	50 0 05015 50 0 54055				FNI FNI	FS0 FS5
00777	50 0 02011 50 0 04451				FNI FNI	VURTER1 SAH
01000	75 0 00774 50 0 00000			SLJ		VURTIS1
01001	75 0 00000 50 0 00000		VURTIS2	SLJ		**
01002	75 4 04611 50 0 44215	+		PTJ FNI		SAR FS4
01003	50 0 14655 50 0 63715			FNI		FS1 FS6
01004	50 0 02012 50 0 04451			FNI FNI		VURTER2 SAH
01005	75 0 01001 50 0 00000			SLJ		VURTIS2
01006	75 0 00000 50 0 00000		LAPLAC1	SLJ		**
01007	75 4 04423 50 0 05015	+		PTJ 00		SAD FS0
01010	50 0 54055 50 0 02004			00 00		FS5 LAPERR1
01011	75 4 04451 50 0 04447	+		RTJ FNI		SAH SAD+24B
01012	50 0 04435 50 0 04435			FNI FNI		SAD+12B SAD+12B
01013	75 0 01006 50 0 00000			SLJ		LAPLAC1
01014	75 0 00000 50 0 00000		LAPLAC2	SLJ		**
01015	75 4 04423 50 0 14655	+		RTJ 00		SAD FS1
01016	50 0 63715 50 0 02005			00 00		FS6 LAPERR2
01017	75 4 04451 50 0 04447	+		RTJ FNI		SAH SAD+24B
01020	50 0 04435 50 0 04435			FNI FNI		SAD+12B SAD+12B
01021	75 0 01014 50 0 00000			SLJ		LAPLAC2
01022	75 0 00000 50 0 00000		HORIZ	SLJ FNI		** 0,4
01023	12 4 05015 14 4 14655		LOOP1	LDA ADD		FS0,4 FS1,4

MURCA:

C1024	20 3 54 55 50 0 0000		STA	FS5,4
C1025	54 4 0750 75 3 0123	+	ISK SLJ	76008,4 LOC1
C1026	75 2 0122 50 0 0000		SLJ	HORIZ
C1027	75 2 0000 50 0 0000	MHAT	SLJ	**
C1030	75 4 0457 00 0 0202	+	RTJ DO	SAJ HATERR
C1031	50 3 4415 50 3 6315		FNI FNI	FS4 FS6
C1032	75 4 0451 00 0 0457	+	RTJ DO	SAH SAJ+7R
C1033	50 0 0457 50 0 0457		FNI FNI	SAJ+7R SAJ+7R
C1034	75 2 0127 50 0 0000		SLJ	MHAT
C1035	75 3 0000 50 0 0000	UTHM1	SLJ	**
C1036	75 4 0451 00 0 0141	DIF1	RTJ DO	SAH OUTSIDE1
C1037	50 0 0143 50 0 0143	+	FNI FNI	INSIDI INSIDI
C1040	75 2 0135 50 0 0000	+	SLJ	UTHM1
C1041	10 0 0000 20 2 0515	CUTSIDE1	FNA STA	0 FS0,2
C1042	75 3 0136 50 0 0000		SLJ	DIF1
C1043	12 2 4421 01 0 0001	INSIDI	LDA ARS	FS4,2 1
C1044	14 0 0173 20 0 0175		ADD STA	CONST1 LOCAT1
C1045	20 0 0175 20 0 0175		MUF STA	LOCAT1 LOCAT1
C1046	12 3 2451 15 1 2451		LDA SUB	FS2,3 FS2,1
C1047	20 0 0176 12 0 0173		STA LDA	LOCAT2 CONST2
C1050	20 2 6371 20 0 0176		MUF MUF	FS6,2 LOCAT2
C1051	27 2 0175 27 2 2451		DVF DVF	LOCAT1 FS2,2
C1052	20 0 0515 75 0 0136		STA SLJ	FS0,2 DIF1
C1053	75 3 0000 50 0 0000	UTHM2	SLJ	**

MURGA J

01054	75 4 04451 50 0 01057		DIF2	RTJ 10	SAH OUTSID2
01055	50 0 01061 50 0 01061	+		FNI FNI	INSID2 INSID2
01056	75 0 01053 50 0 00000	+		SLJ	UTHM2
01057	10 0 00000 20 2 14655	OUTSID2		FNA STA	0 FS1,2
01060	75 0 01054 50 0 00000			SLJ	DIF2
01061	12 2 44215 01 0 00001	INSID2		LDA ARS	FS4,2 1
01062	14 0 01733 20 0 01775			ADD STA	CONSIL LOCAT1
01063	26 0 01775 20 0 01775			MUF STA	LOCAT1 LOCAT1
01064	12 3 34355 15 1 34355			LDA SUR	FS3,3 FS3,1
01065	20 0 01776 12 0 01734			STA LDA	LOCAT2 CONST2
01066	26 0 63715 26 0 01776			MUF MUF	FS6,2 LOCAT2
01067	27 0 01775 27 2 34355			DVF DVF	LOCAT1 FS3,2
01070	20 2 14655 75 0 01054			STA SLJ	FS1,2 DIF2
01071	75 0 00000 50 4 00000	DUTHM		SLJ FNI	** 0,4
01072	12 4 05015 15 4 14655	LOOP4		LDA SUR	FS0,4 FS1,4
01073	20 4 05015 50 0 00000			STA	FS0,4
01074	54 4 07600 75 0 01072	+		ISK SLJ	76008,4 LOOP4
01075	75 0 01071 50 0 00000			SLJ	DUTHM
01076	75 0 00000 50 0 00000	VTHM1		SLJ	**
01077	75 4 04451 00 0 01102	DIF3		RTJ 00	SAH OUTSID3
01100	50 0 01104 50 0 01104	+		FNI FNI	INSID3 INSID3
01101	75 0 01076 50 0 00000	+		SLJ	VTHM1
01102	10 0 00000 20 2 14655	OUTSID3		FNA STA	0 FS1,2
01103	75 0 01077 50 0 00000			SLJ	DIF3

MURRAY

C1104	12 2 44215 01 0 00001	POSITION	LDA ARS	FS4,2 1
C1105	14 2 01734 20 0 01775		ADD STA	CONST1 LOCAT1
C1106	26 0 01775 20 0 01775		MUF STA	LOCAT1 LOCAT1
C1107	12 2 24516 15 2 24514		LDA SUB	FS2+1,2 FS2-1,2
C1110	20 0 01776 12 0 01734		STA LDA	LOCAT2 CONST2
C1111	26 2 63715 20 0 01776		MUF MUF	FS6,2 LOCAT2
C1112	27 0 01775 27 2 24515		DVF DVF	LOCAT1 FS2,2
C1113	20 2 14655 75 0 01677		STA SLJ	FS1,2 DIF3
C1114	75 0 00000 50 0 00000	VTHM2	SLJ	**
C1115	75 4 04451 00 0 01120	DIF4	RTJ CU	SAH OUTSID4
C1116	50 0 01122 50 0 01122	+	ENI ENI	INSID4 INSID4
C1117	75 0 01114 50 0 00000	+	SLJ	VTHM2
C1120	10 0 00000 20 2 24515	OUTSID4	ENA STA	0 FS2,2
C1121	75 0 01115 50 0 00000		SLJ	DIF4
C1122	12 2 44215 01 0 00001	INSID4	LDA ARS	FS4,2 1
C1123	14 0 01733 20 0 01775		ADD STA	CONST1 LOCAT1
C1124	26 0 01775 20 0 01775		MUF STA	LOCAT1 LOCAT1
C1125	12 2 34356 15 2 34354		LDA SUB	FS3+1,2 FS3-1,2
C1126	20 0 01776 12 0 01734		STA LDA	LOCAT2 CONST2
C1127	26 2 63715 26 0 01776		MUF MUF	FS6,2 LOCAT2
C1130	27 0 01775 27 2 34355		DVF DVF	LOCAT1 FS3,2
C1131	20 2 24515 75 0 01115		STA SLJ	FS2,2 DIF4
C1132	75 0 00000 50 4 00000	CVTHM	SLJ ENI	** 0,4
C1133	12 4 24515 15 2 14655	LOOP7	LDA SUB	FS2,4 FS1,4

MURRAY

C1134	20 4 14655 50 0 00000		STA	FS1,4
C1135	54 4 07600 75 0 01133	+	ISK SLJ	76008,4 LOOP7
C1136	75 0 01132 50 0 00000		SLJ	DVTHM
C1137	75 0 00900 50 4 00000	DTHM	SLJ FNI	** 0,4
C1140	12 4 05015 20 4 05015	LOOP8	LDA MUF	FS0,4 FS0,4
C1141	20 4 05015 12 4 14655		STA LDA	FS0,4 FS1,4
C1142	26 4 14655 14 4 05015		MUF ADD	FS1,4 FS0,4
C1143	75 4 04666 00 0 02113	+	RTJ 90	VAB SQERR
C1144	20 4 05015 50 0 00000	+	STA	FS0,4
C1145	54 4 07600 75 0 01140	+	ISK SLJ	76008,4 LOOP8
C1146	75 0 01137 50 0 00000		SLJ	DTHM
C1147	75 0 00000 50 4 00000	KAT1	SLJ FNI	** 0,4
C1150	12 4 54055 15 4 05015	LOOP9	LDA SUB	FS5,4 FS0,4
C1151	20 4 54055 50 0 00000		STA	FS5,4
C1152	54 4 07600 75 0 01150	+	ISK SLJ	76008,4 LOOP9
C1153	75 0 01147 50 0 00000		SLJ	KAT1
C1154	75 0 00000 50 0 00000	UGEOS1	SLJ	**
C1155	75 4 04451 00 0 01160	DIF5	RTJ 90	SAH OUTSID5
C1156	50 0 01162 50 0 01162	+	FNI FNI	INSID5 INSID5
C1157	75 0 01156 50 0 00000	+	SLJ	UGEOS1
C1160	10 0 00000 20 2 24515	OUTSID5	FNA STA	0 FS2,2
C1161	75 0 01155 50 0 00000		SLJ	DIF5
C1162	12 2 44215 01 0 00001	INSID5	LDA ARS	FS4,2 1
C1163	14 0 01733 20 0 01775		ADD STA	CUNST1 LOCAT1

MURGAN

01214	20 4 24515 50 0 00000		STA	FS2,4
01215	54 4 07600 75 0 01211	+	ISK SLJ	76008,4 LOOPI0
01216	75 0 01210 50 0 00000		SLJ	UGF05
01217	75 0 00000 50 0 00000	VGEO51	SLJ	**
01220	75 4 04451 00 0 01223	DIF7	RTJ CO	SAH OUTSID7
01221	50 0 01225 50 0 01225	+	ENI ENI	INSID7 INSID7
01222	75 0 01217 50 0 00000	+	SLJ	VGEO51
01223	10 0 00000 20 2 34355	OUTSID7	ENA STA	0 FS3,2
01224	75 0 01220 50 0 00000		SLJ	DIF7
01225	12 2 44215 01 0 00001	INSID7	LDA ARS	FS4,2 1
01226	14 0 01733 20 0 01775		ADD STA	CONST1 LOCAT1
01227	26 0 01775 20 0 01775		MUF STA	LOCAT1 LOCAT1
01230	12 2 05016 15 2 05014		LDA SUR	FS0+1,2 FS0-1,2
01231	20 0 01776 12 0 01734		STA LDA	LOCAT2 CONST2
01232	26 2 63715 26 0 01776		MUF MUF	FS6,2 LOCAT2
01233	27 0 01775 20 2 34355		DVF STA	LOCAT1 FS3,2
01234	75 0 01220 50 0 00000		SLJ	DIF7
01235	75 0 00000 50 0 00000	VGEO52	SLJ	**
01236	75 4 04451 00 0 01241	DIF8	RTJ CO	SAH OUTSID8
01237	50 0 01243 50 0 01243	+	ENI ENI	INSID8 INSID8
01240	75 0 01235 50 0 00000	+	SLJ	VGEO52
01241	10 0 00000 20 2 05015	OUTSID8	ENA STA	0 FS0,2
01242	75 0 01236 50 0 00000		SLJ	DIF8
01243	12 2 44215 01 0 00001	INSID8	LDA ARS	FS4,2 1

01244	14 0 01733 20 0 01775	ADD STA	CONST1 LOCAT1
01245	26 0 01775 20 0 01775	MUF STA	LOCAT1 LOCAT1
01246	12 2 14556 15 2 14654	LDA SUB	FS1+1,2 FS1-1,2
01247	20 0 01776 12 0 01734	STA LDA	LOCAT2 CONST2
01250	26 2 63715 26 0 01776	MUF MUF	FS6,2 LOCAT2
01251	27 0 01775 20 2 05015	DVF STA	LOCAT1 FS0,2
01252	75 0 01236 50 0 00000	SLJ	DIFR
01253	75 0 00000 50 4 00000	SLJ ENI	** 0,4
01254	12 4 34355 05 0 00003	LDA ALS	FS3+4 3
01255	20 0 01775 12 4 05015	STA LDA	LOCAT1 FS0,4
01256	05 0 00003 14 0 01775	ALS ADD	3 LOCAT1
01257	20 4 05015 50 0 00000	STA	FS0,4
01260	54 4 07600 75 0 01254	ISK SLJ	76008,4 LOOP11
01261	75 0 01253 50 0 00000	SLJ	VGEOS
01262	75 0 00000 50 4 00000	SLJ ENI	** 0,4
01263	12 4 24515 26 4 24515	LDA MUF	FS2,4 FS2,4
01264	20 0 01775 12 4 05015	STA LDA	LOCAT1 FS0,4
01265	26 4 05015 20 0 01776	MUF STA	FS0,4 LOCAT2
01266	14 0 01775 01 0 00001	ADD ARS	LOCAT1 1
01267	20 4 05015 12 0 01775	STA LDA	FS0,4 LOCAT1
01270	15 0 01776 20 4 44215	SUB STA	LOCAT2 FS4,4
01271	26 4 44215 20 4 44215	MUF STA	FS4,4 FS4,4
01272	54 4 07600 75 0 01263	ISK SLJ	76008,4 LOOP12
01273	75 0 01262 50 0 00000	SLJ	KINETIC

MURGAJ

01274	75 0 00000 50 0 00000	LAPKIN	SLJ	**
01275	75 4 04423 00 0 63715	+	RTJ 00	SAD FS6
01276	00 0 05015 00 0 02006		00 00	FSU LAPERR3
01277	75 4 04451 50 0 04447	+	RTJ FNI	SAH SAU+24B
01300	50 0 04435 50 0 04435		FNI FNI	SAD+12B SAU+12B
01301	50 4 00000 50 0 00000		FNI	0,4
01302	12 4 63715 26 4 63715	ABS	LDA MUF	FS6,4 FS6,4
01303	20 4 63715 50 0 00000		STA	FS6,4
01304	54 4 07600 75 0 01302	+	ISK SLJ	7600B,4 ARS
01305	75 0 01274 50 0 00000		SLJ	LAPKIN
01306	75 0 00000 50 4 00000	KAT2	SLJ FNI	** 0,4
01307	12 4 54055 15 4 05015	LOOP13	LDA SUB	FS5,4 FS0,4
01310	15 4 63715 15 4 44215		SUB SUB	FS6,4 FS4,4
01311	20 4 05015 50 0 00000		STA	FS0,4
01312	54 4 07600 75 0 01307	+	ISK SLJ	7600B,4 LOOP13
01313	75 0 01306 50 0 00000		SLJ	KAT2
01314	75 0 00000 50 0 00000	READ01	SLJ	**
01315	12 0 02001 16 0 01751	+	LDA LDQ	TIME NAMES
01316	75 4 04231 00 0 00000	+	RTJ 00	MAG 0,0
01317	50 0 02014 50 0 01260		FNI FNI	MAA 1200B
01320	50 0 44215 50 0 02007		FNI FNI	FS4 READERR
01321	75 0 01314 50 0 00000		SLJ	READ01
01322	75 0 00000 50 0 00000	UNPCK01	SLJ FNI	** 0,6
01323	75 0 01325 00 0 44215	+	SLJ 00	**2 FS4

01324	00 0 54055 00 0 02453		00 00	FS5 2453B
01325	75 4 04715 50 0 00007	+	RTJ FNI	WAB 7
01326	75 0 01322 50 0 00000		SLJ	UNPCK01
01327	75 0 00000 50 0 00000	READ02	SLJ	**
01330	12 0 02001 16 0 01754	+	LDA LDQ	TIME NAME 6
01331	75 4 04231 00 0 00000	+	RTJ 00	MAG 0,0
01332	50 0 02014 50 0 01200		FNI FNI	MAA 1200B
01333	50 0 44215 50 0 02007		FNI FNI	FS4 READERR
01334	75 0 01327 50 0 00000		SLJ	READ02
01335	75 0 00000 50 0 00000	UNPCK02	SLJ FNI	** 0,6
01336	75 0 01340 00 0 44215	+	SLJ 00	**2 FS4
01337	00 0 63715 00 0 02453		00 00	FS6 2453B
01340	75 4 04715 50 0 00007	+	PTJ FNI	WAB 7
01341	75 0 01335 50 0 00000		SLJ	UNPCK02
01342	75 0 00000 50 0 00000	MOORE	SLJ	**
01343	75 4 04371 00 0 14655	+	RTJ 00	SAB FS1
01344	00 0 34355 00 0 63715		00 00	FS4 FS6
01345	00 0 00000 00 0 02003	+	00 00	JACERR
01346	75 4 04451 50 0 04420	+	RTJ FNI	SAH SAB+27B
01347	50 0 04406 50 0 04406	+	FNI FNI	SAB+15B SAB+15B
01350	50 4 00000 50 0 00000		FNI	0,4
01351	12 4 14655 05 0 00013	SHIFT	LDA ALS	FS1,4 11
01352	20 4 14655 50 0 00000		STA	FS1,4
01353	54 4 07600 75 0 01351	+	ISK SLJ	7600B,4 SHIFT

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01354	75 0 01342 50 0 00000		SLJ	MOORE
01355	75 0 00000 50 4 00000	HURDVG	SLJ FNI	** 0,4
01356	12 4 54055 01 0 00001	LOOP15	LDA ARS	FS5,4 1
01357	20 0 01775 12 4 63715		STA LDA	LOCAT1 FS6,4
01360	01 0 00001 20 0 01776		ARS STA	LOCAT2 1
01361	12 0 01775 15 0 01776		LDA SUB	LOCAT1 LOCAT2
01362	20 4 54055 50 0 00000		STA	FS5,4
01363	54 4 07600 75 0 01356	+	ISK SLJ	7600B,4 LOOP15
01364	75 0 01355 50 0 00000		SLJ	HURDVG
01365	75 0 00000 50 0 00000	ARSDIV	SLJ FNI	** 0,4
01366	12 4 54055 26 4 54055	LOOP17	LDA MUF	FS5,4 FS5,4
01367	05 0 00016 50 0 00000		ALS	14
01370	20 4 54055 50 0 00000	+	STA	FS5,4
01371	54 4 07600 75 0 01366	+	ISK SLJ	7600B,4 LOOP17
01372	75 0 01365 50 0 00000		SLJ	ARSDIV
01373	75 0 00000 50 4 00000	KAT	SLJ FNI	** 0,4
01374	12 4 05015 15 4 54055	LOOP15	LDA SUB	FS0,4 FS5,4
01375	15 4 14655 20 4 05015		SUM STA	FS1,4 FS0,4
01376	54 4 07600 75 0 01374	+	ISK SLJ	7600B,4 LOOP16
01377	75 0 01373 50 0 00000		SLJ	KAT
01400	75 0 00000 12 0 01757	LAYER	SLJ LDA	** COUNT
01401	05 0 00001 20 0 01757		ALS STA	1 COUNT
01402	22 3 01400 12 0 01736		AJPM LDA	LAYER2 NAME1A
01403	20 0 01735 12 0 01741		STA LDA	NAME1 NAME2A

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01404	20 0 01740 12 0 01744	STA LDA	NAME2 NAME3A
01405	20 0 01743 12 0 01747	STA LDA	NAME3 NAME4A
01406	20 0 01746 12 0 01753	STA LDA	NAME4 NAME6A
01407	20 0 01754 12 0 01761	STA LDA	NAME6 LEVEL2
01410	20 0 01471 20 0 01515	STA STA	TITLE+3 TITLE1+3
01411	20 0 01541 20 0 01565	STA STA	TITLE2+3 TITLE3+3
01412	20 0 01611 20 0 01635	STA STA	TITLE4+3 TITLE5+3
01413	20 0 01661 20 0 01705	STA STA	TITLE6+3 TITLE7+3
01414	20 0 01731 12 0 01763	STA LDA	TITLE8+3 A2
01415	20 0 01461 12 0 01765	STA LDA	A1 B2
01416	20 0 01462 12 0 01767	STA LDA	B1 C2
01417	20 0 01464 12 0 01771	STA LDA	C1 D2
01420	20 0 01463 12 0 01773	STA LDA	D1 E2
01421	61 0 01460 12 0 01777	SAL LDA	E1 TAPUNIT
01422	61 0 00710 61 0 00736	SAL SAL	HIGH HIGH
01423	75 0 00601 50 0 00000	SLJ	START
01424	75 0 00900 12 0 01760	SLJ LDA	** COUNT1
01425	05 0 00901 20 0 01760	ALS STA	I COUNT1
01426	22 0 01424 12 0 01737	AJPM LDA	LAYER3 NAME1B
01427	20 0 01735 12 0 01742	STA LDA	NAME1 NAME2B
01430	20 0 01740 12 0 01745	STA LDA	NAME2 NAME3B
01431	20 0 01743 12 0 01750	STA LDA	NAME3 NAME4B
01432	20 0 01746 12 0 01753	STA LDA	NAME4 NAME5B
01433	20 0 01751 12 0 01756	STA LDA	NAME5 NAME6B

01434	20 0 01754 12 0 01762	STA LOA	NAME6 LEVEL3
01435	20 0 01471 20 0 01515	STA STA	TITLE+3 TITLE1+3
01436	20 0 01541 20 0 01565	STA STA	TITLE2+3 TITLE3+3
01437	20 0 01611 20 0 01635	STA STA	TITLE4+3 TITLE5+3
01440	20 0 01661 20 0 01705	STA STA	TITLE6+3 TITLE7+3
01441	20 0 01731 12 0 01764	STA LOA	TITLE8+3 A3
01442	20 0 01461 12 0 01766	STA LOA	A1 B3
01443	20 0 01462 12 0 01770	STA LOA	B1 C3
01444	20 0 01464 12 0 01772	STA LOA	C1 D3
01445	20 0 01463 12 0 01774	STA LOA	D1 E3
01446	61 0 01460 75 0 00601	SAL SLJ	E1 START
01447	75 0 00000 10 0 00012	SLJ FNA	** 10
01450	20 0 00017 50 0 00000	STA	17B
01451	75 0 01455 00 0 00000	SLJ 00	**+ 0
01452	00 0 14655 00 0 63715	00 00	FS1 FS6
01453	00 0 00047 00 0 00035	00 00	39 29
01454	00 0 00022 00 0 00010	00 00	18 8
01455	75 4 04745 00 0 00000	RTJ 00	WAE 0
01456	75 4 02524 00 0 63715	RTJ 00	MAC FS6+0
01457	75 0 01447 77 7 63715	SLJ 77	PRINT FS6+7
01460	10 0 02000 00 0 00004	10 00	IAU 4
01461	13 1 11710 47 6 40243	0CT 0CT	1311171047640243
01462	02 4 76132 61 0 70664	0CT	0247613261070664
01463	00 1 42600 00 0 00000	0CT	0014260000000000

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C1464	01 3 56 00 00 0 00 00	C1	001	013567000000000000		
C1465	00 0 00 26 00 0 00 26		00	22 22		
C1466	20 4 34626 05 3 12943	TITLE	BCD	4, LOWER LEVEL Z FIELD	LAYER 1	
C1467	05 2 56543 20 3 12566	TITLE	BCD	4, LOWER LEVEL Z FIELD	LAYER 1	
C1470	71 6 54364 20 3 02020	TITLE	BCD	4, LOWER LEVEL Z FIELD	LAYER 1	
C1471	43 5 13065 51 2 00120	TITLE	BCD	4, LOWER LEVEL Z FIELD	LAYER 1	
C1472	75 0 01447 55 0 00900		SLJ	PRINT		
C1473	75 0 00000 10 0 00012	PRINT	SLJ PNA	** 10		
C1474	20 0 00000 00 0 00000		STA	178		
C1475	75 0 01501 00 0 00000	+	SLJ 00	**4 0		
C1476	00 0 54255 20 0 63715		00 00	FS5 FS6		
C1477	00 0 00047 00 0 00035		00 00	39 29		
C1500	00 0 00222 00 0 00010		00 00	18 8		
C1501	75 4 04745 00 0 00000	+	RTJ 00	WAE 0		
C1502	75 4 02544 00 0 63715	+	RTJ 00	MAC FS6,0		
C1503	75 0 01473 77 0 63715		SLJ 77	PRINT1 FS6,7		
C1504	10 0 02000 00 0 00001		10 00	TAU 1		
C1505	00 0 00000 00 0 00000		00 00	0		
C1506	20 0 00000 00 0 00000		00 00	50-1847		
C1507	00 0 00000 00 0 00000		00 00	0		
C1510	03 1 46314 00 0 46314		00 00	10-1847		
C1511	00 0 00000 00 0 00000		00 00	25 25		
C1512	20 4 36147 43 4 16371	TITLE	000	4, LAPLACIAN OF VORTICITY LAYER 1		
C1513	01 4 52046 00 0 00546	TITLE	00	4, LAPLACIAN OF VORTICITY LAYER 1		

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01514	51 2 37163 71 2 33020	TITLE1	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01515	43 6 13065 51 2 00120	TITLE1	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01516	75 0 01473 50 0 00000	SLJ	PRINT1	
01517	75 0 00000 10 0 00012	PRINT2	SLJ ENA	** 10
01520	20 0 00017 30 0 00000		STA	178
01521	75 0 01525 00 0 00000	+	SLJ 00	** 0
01522	00 0 05015 00 0 63715		00 00	FS0 FS6
01522	00 0 05015		00	FS0
01523	00 0 00047 00 0 00035		00 00	39 29
01524	00 0 00022 00 0 00010		00 00	18 8
01525	75 4 04745 00 0 00000	SKIP	RTJ 00	WAE 0
01526	75 4 02524 00 0 63715	+	RTJ 00	MAC FS6,0
01527	75 0 01517 77 7 63715		SLJ 77	PRINT2 FS6,7
01530	10 0 02000 00 0 00001		10 00	TAU 1
01531	00 0 00000 00 0 00000		OCI 0	0
01532	20 0 00000 00 0 00000		DEC	5D-1847
01533	00 0 00000 00 0 00000		OCI 0	0
01534	00 6 31463 14 6 31463		DEC	25D-3847
01535	00 0 00026 00 0 00026		00 00	22 22
01536	20 2 56551 23 2 06751	TITLE2	BCD	4, VERT GRAD OF VT LAYER 1
01537	61 6 42046 66 2 02523	TITLE2	BCD	4, VERT GRAD OF VT LAYER 1
01540	20 2 02020 20 2 02020	TITLE2	BCD	4, VERT GRAD OF VT LAYER 1
01541	43 6 13065 51 2 00120	TITLE2	BCD	4, VERT GRAD OF VT LAYER 1
01542	75 0 01517 50 0 00000		SLJ	PRINT2
01543	75 0 00000 10 0 00012	PRINT3	SLJ ENA	** 10

NR00000

01544	00 0 00017	STA	17B	
01545	75 0 01551	SLJ	**4	
01546	00 0 00000			
01547	00 0 04055		F55	
01548	00 0 03715		F56	
01549	00 0 00047	00	39	
01550	00 0 00035	00	27	
01551	00 0 00022	00	18	
01552	00 0 00015	00	8	
01553	75 4 04765	PTJ	WAE	
01554	00 0 00000	00	0	
01555	75 4 02324	RIJ	MAC	
01556	00 0 03715	00	F56,0	
01557	75 0 01543	SLJ	PRINT3	
01558	77 7 03715	77	F56,7	
01559	00 0 00000	00	TAU	
01560	00 0 00000	00	0	
01561	00 0 00000	DEC	50-1847	
01562	00 0 00000	00	0	
01563	00 0 00000	DEC	10-1847	
01564	03 1 46314	00	22	
01565	63 1 46314	00	22	
01566	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01567	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01568	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01569	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01570	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01571	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01572	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01573	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01574	43 6 10000	SLJ	PRINT3	
01575	51 6 00120	SLJ	**4	
01576	75 0 01543	SLJ	10	
01577	50 0 00000	FNA	10	
01578	75 0 00000	STA	17B	
01579	20 0 00017	00	**4	
01580	50 0 00000	00	0	
01581	75 0 01575	00	F56	
01582	00 0 05012	00	39	
01583	00 0 03715	00	27	
01584	00 0 00047	00	18	
01585	00 0 00035	00	8	
01586	00 0 00022	00	WAE	
01587	00 0 00015	00	MAC	
01588	75 4 04765	00	F56,0	
01589	00 0 00000	00	PRINT3	
01590	77 7 03715	77	F56,7	
01591	00 0 00000	00	TAU	
01592	00 0 00000	00	0	
01593	00 0 00000	DEC	50-1847	
01594	00 0 00000	00	0	
01595	00 0 00000	DEC	10-1847	
01596	03 1 46314	00	22	
01597	63 1 46314	00	22	
01598	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01599	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01600	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01601	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01602	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01603	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01604	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01605	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01606	43 6 10000	SLJ	PRINT3	
01607	51 6 00120	SLJ	**4	
01608	75 0 01543	SLJ	10	
01609	50 0 00000	FNA	10	
01610	75 0 00000	STA	17B	
01611	20 0 00017	00	**4	
01612	50 0 00000	00	0	
01613	75 0 01575	00	F56	
01614	00 0 05012	00	39	
01615	00 0 03715	00	27	
01616	00 0 00047	00	18	
01617	00 0 00035	00	8	
01618	00 0 00022	00	WAE	
01619	00 0 00015	00	MAC	
01620	75 4 04765	00	F56,0	
01621	00 0 00000	00	PRINT3	
01622	77 7 03715	77	F56,7	
01623	00 0 00000	00	TAU	
01624	00 0 00000	00	0	
01625	00 0 00000	DEC	50-1847	
01626	00 0 00000	00	0	
01627	00 0 00000	DEC	10-1847	
01628	03 1 46314	00	22	
01629	63 1 46314	00	22	
01630	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01631	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01632	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01633	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01634	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01635	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01636	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01637	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01638	43 6 10000	SLJ	PRINT3	
01639	51 6 00120	SLJ	**4	
01640	75 0 01543	SLJ	10	
01641	50 0 00000	FNA	10	
01642	75 0 00000	STA	17B	
01643	20 0 00017	00	**4	
01644	50 0 00000	00	0	
01645	75 0 01575	00	F56	
01646	00 0 05012	00	39	
01647	00 0 03715	00	27	
01648	00 0 00047	00	18	
01649	00 0 00035	00	8	
01650	00 0 00022	00	WAE	
01651	00 0 00015	00	MAC	
01652	75 4 04765	00	F56,0	
01653	00 0 00000	00	PRINT3	
01654	77 7 03715	77	F56,7	
01655	00 0 00000	00	TAU	
01656	00 0 00000	00	0	
01657	00 0 00000	DEC	50-1847	
01658	00 0 00000	00	0	
01659	00 0 00000	DEC	10-1847	
01660	03 1 46314	00	22	
01661	63 1 46314	00	22	
01662	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01663	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01664	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01665	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01666	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01667	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01668	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01669	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01670	43 6 10000	SLJ	PRINT3	
01671	51 6 00120	SLJ	**4	
01672	75 0 01543	SLJ	10	
01673	50 0 00000	FNA	10	
01674	75 0 00000	STA	17B	
01675	20 0 00017	00	**4	
01676	50 0 00000	00	0	
01677	75 0 01575	00	F56	
01678	00 0 05012	00	39	
01679	00 0 03715	00	27	
01680	00 0 00047	00	18	
01681	00 0 00035	00	8	
01682	00 0 00022	00	WAE	
01683	00 0 00015	00	MAC	
01684	75 4 04765	00	F56,0	
01685	00 0 00000	00	PRINT3	
01686	77 7 03715	77	F56,7	
01687	00 0 00000	00	TAU	
01688	00 0 00000	00	0	
01689	00 0 00000	DEC	50-1847	
01690	00 0 00000	00	0	
01691	00 0 00000	DEC	10-1847	
01692	03 1 46314	00	22	
01693	63 1 46314	00	22	
01694	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01695	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01696	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01697	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01698	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01699	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01700	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01701	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01702	43 6 10000	SLJ	PRINT3	
01703	51 6 00120	SLJ	**4	
01704	75 0 01543	SLJ	10	
01705	50 0 00000	FNA	10	
01706	75 0 00000	STA	17B	
01707	20 0 00017	00	**4	
01708	50 0 00000	00	0	
01709	75 0 01575	00	F56	
01710	00 0 05012	00	39	
01711	00 0 03715	00	27	
01712	00 0 00047	00	18	
01713	00 0 00035	00	8	
01714	00 0 00022	00	WAE	
01715	00 0 00015	00	MAC	
01716	75 4 04765	00	F56,0	
01717	00 0 00000	00	PRINT3	
01718	77 7 03715	77	F56,7	
01719	00 0 00000	00	TAU	
01720	00 0 00000	00	0	
01721	00 0 00000	DEC	50-1847	
01722	00 0 00000	00	0	
01723	00 0 00000	DEC	10-1847	
01724	03 1 46314	00	22	
01725	63 1 46314	00	22	
01726	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01727	00 0 00026	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01728	20 0 12565	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01729	51 6 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01730	20 0 47125	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01731	65 5 16765	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01732	45 6 36520	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01733	20 0 02020	PCD	4, AVERAGE DIVERGENCE	LAYER 1
01734	43 6 10000	SLJ	PRINT3	
01735	51 6 00120	SLJ	**4	
01736	75 0 01543	SLJ	10	
01737	50 0 00000	FNA	10	
01738	75 0 00000	STA	17B	
01739	20 0 00017	00	**4	
01740	50 0 00000	00	0	
01741	75 0 01575	00	F56	
01742	00 0 05012	00	39	
01743	00 0 03715	00	27	
01744	00 0 00047	00	18	
01745	00 0 00035	00	8	
01746	00 0 00022	00	WAE	
01747	00 0 00015	00	MAC	
01748	75 4 04765	00	F56,0	
01749	00 0 00000	00	PRINT3	
01750	77 7 03715	77	F56,7	
01751	00 0 00000	00	TAU	
01752	00 0 00000	00	0	
01753	00 0 00000	DEC	50-1847	
01754	00 0 00000	00	0	
01755	00 0 00000	DEC	10-1847	
01756	03 1 46314	00	22	
01757	63 1 46314	00	22	

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01574	00 0 00022	00 0 00010	128	
01575	75 4 04745	RTJ 00	WAE 0	
01576	75 4 02524	RTJ 00	MAC FS6.0	
01577	75 0 01567	SLJ 77	PRINT4 FS6.7	
01600	10 0 02000	10 00	TAU 1	
01601	00 0 00000	OCT 0		
01602	20 0 00000	DEC 50-1847		
01603	00 0 00000	OCT 0		
01604	03 1 46314	DEC 10-1847		
01605	00 0 00026	00 22		
01606	20 4 27143	TITLE4 BCD	4, KINETIC ENERGY	LAYER 1
01607	20 6 54565	TITLE4 BCD	4, KINETIC ENERGY	LAYER 1
01610	20 2 02020	TITLE4 BCD	4, KINETIC ENERGY	LAYER 1
01611	43 6 13065	TITLE4 BCD	4, KINETIC ENERGY	LAYER 1
01612	75 0 01567	SLJ PRINT4		
01613	75 0 00000	SLJ ENA 10	** 10	
01614	20 0 00017	STA 178		
01615	75 0 01621	SLJ 00	**4 0	
01616	00 0 44215	00 00	FS4 FS6	
01617	00 0 00047	00 00	39 29	
01620	00 0 00022	00 00	18 8	
01621	75 4 04745	RTJ 00	WAE 0	
01622	75 4 02524	RTJ 00	MAC FS6.0	
01623	75 0 01613	SLJ 77	PRINT5 FS6.7	

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C1624	10 0 02000 00 0 00001	10 0 00	TAU 1			
C1625	00 0 00000 00 0 00000	00T 0	0			
C1626	20 0 00000 00 0 00000	00EC 0	50-1847			
C1627	00 0 00000 00 0 00000	00T 0	0			
C1630	03 1 46314 03 1 46314	00EC 0	10-1847			
C1631	00 0 00026 00 0 00026	00 00	22 22			
C1632	20 4 27145 23 2 06545	000 000	4, KINT ENERGY DIFF		LAYER 1	
C1633	65 5 16730 20 6 47166	000 000	4, KINT ENERGY DIFF		LAYER 1	
C1634	66 2 02020 00 0 02020	000 000	4, KINT ENERGY DIFF		LAYER 1	
C1635	43 6 13065 51 2 00120	000 000	4, KINT ENERGY DIFF		LAYER 1	
C1636	75 0 01613 50 0 00000	000 000	4, KINT ENERGY DIFF		LAYER 1	
C1637	75 0 00000 10 0 00012	000 000	PRINTS			
C1640	20 0 00017 50 0 00000	000 000	STA 178			
C1641	75 0 01645 00 0 00000	000 000	++ 0			
C1642	00 0 63715 00 0 14655	000 000	FS6 FS1			
C1643	00 0 00047 00 0 00035	000 000	39 29			
C1644	00 0 00022 00 0 00010	000 000	18 8			
C1645	75 4 04745 00 0 00000	000 000	WAE 0			
C1646	75 4 02524 00 0 14655	000 000	MAC FS1,3			
C1647	75 0 01637 77 7 14655	000 000	PRINT6 FS1,7			
C1650	10 0 02000 00 0 00001	000 000	TAU 1			
C1651	00 0 00000 00 0 00000	000 000	0			
C1652	20 0 00000 00 0 00000	000 000	50-1847			
C1653	00 0 00000 00 0 00000	000 000	0			

01654	4 3 31463						
01655	00 0 00006						
01656	20 6 37045						
	57 2 07145						
01657	20 4 27145						
	65 2 37163						
01660	20 6 54565						
	51 6 73120						
01661	43 6 13065						
	51 2 00120						
01662	75 0 01637						
	50 0 00000						
01663	75 0 00000						
	10 0 00012						
01664	20 0 00017						
	50 0 00000						
01665	75 0 01671						
	00 0 00000						
01666	20 0 05015						
	00 0 63715						
01667	00 0 00047						
	00 0 00135						
01670	00 0 00022						
	00 0 00010						
01671	75 4 04745						
	00 0 00000						
01672	75 4 02524						
	00 0 63715						
01673	75 0 01663						
	77 7 63715						
01674	10 0 02000						
	00 0 00001						
01675	00 0 00000						
	00 0 00000						
01676	20 0 00000						
	00 0 00000						
01677	00 0 00000						
	00 0 00000						
01700	10 0 00000						
	00 0 00000						
01701	00 0 00026						
	00 0 00026						
01702	20 4 75146						
	67 2 04261						
01703	23 2 06671						
	65 4 36420						
		TITLE6	BCD		4, CHNG IN KINLTIC ENRGY LAYER 1		
		TITLE6	BCD		4, CHNG IN KINLTIC ENRGY LAYER 1		
		TITLE6	BCD		4, CHNG IN KINLTIC ENRGY LAYER 1		
		TITLE6	BCD		4, CHNG IN KINLTIC ENRGY LAYER 1		
		PRINT7	SLJ	PRINT6			
			SLJ	**			
			STA	17B			
			SLJ	**4			
			FS0	FS6			
			39	29			
			18	8			
			WAE	0			
			RTJ	MAC			
			FS6,0	PRINT7			
			FS6,7	TAU			
			10	1			
			OCT	0			
			DEC	50-1B47			
			OCT	0			
			DEC	250-2B47			
			00	22			
			00	22			
		TITLE7	BCD	4, PROG KAT FIELD			LAYER 1
		TITLE7	BCD	4, PROG KAT FIELD			LAYER 1

		TITLE7	RCD	4, PROG KAT FIELD	LAYER 1
01704	20 2 02120 20 2 02020		RCD	4, PROG KAT FIELD	LAYER 1
01705	43 6 13065 51 2 00120	TITLE7	RCD	4, PROG KAT FIELD	LAYER 1
01706	75 2 01663 50 2 00000		SLJ	PRINT7	
01707	75 2 00000 10 2 00012	PRINT3	SLJ ENA	** 10	
01710	20 0 00017 50 0 00000		STA	178	
01711	75 2 01715 00 2 00000	+	SLJ 00	**4 0	
01712	00 2 14555 00 2 63715		00 00	FS1 FS6	
01713	00 2 00007 00 0 00035		00 00	39 29	
01714	00 2 00022 00 2 00015		00 00	18 8	
01715	75 4 04745 20 2 00000	+	RTJ 00	W4 0	
01716	75 4 02524 00 2 63715	+	RTJ 00	MAC FS6,0	
01717	75 2 01707 77 7 63715		SLJ 77	PRINT8 FS6,7	
01720	10 0 02000 00 2 00001		10 00	TAU 1	
01721	00 0 00000 00 2 00000		OCT 0	0	
01722	20 2 00000 00 2 00000		DEC	50-1847	
01723	00 2 00000 00 2 00000		OCT 0	0	
01724	03 1 46314 63 1 46314		DEC	10-1847	
01725	00 2 00026 00 2 00026		00 00	22 22	
01726	20 6 16425 65 6 32046	TITLE8	RCD	4, ADVEC OF OMEGA BY TEMP LAYER 1	
01727	66 2 04644 65 6 76120	TITLE8	RCD	4, ADVEC OF OMEGA BY TEMP LAYER 1	
01730	62 3 02123 65 4 44720	TITLE8	RCD	4, ADVEC OF OMEGA BY TEMP LAYER 1	
01731	43 6 13065 51 2 00120	TITLE8	RCD	4, ADVEC OF OMEGA BY TEMP LAYER 1	
01732	75 2 01707 50 2 00000		SLJ	PRINT8	
01733	20 2 00000 00 0 00000	CONST1	DEC	50-1847	

MORGAN

01734	05 5 11512 62 5 77555	CONST2	DEC	176370-5047
01735	64 2 02003 12 1 22020	NAME1	OCT	6420200312122020
01736	64 2 02002 12 1 22020	NAME1A	OCT	64202000212122020
01737	64 2 02001 12 1 22020	NAME1B	OCT	6420200112122020
01740	64 2 02005 12 1 22020	NAME2	OCT	64202000512122020
01741	64 2 02003 12 1 22020	NAME2A	OCT	64202000312122020
01742	64 2 02002 12 1 22020	NAME2B	OCT	64202000212122020
01743	23 2 02003 12 1 22020	NAME3	OCT	23202000312122020
01744	23 2 02002 12 1 22020	NAME3A	OCT	23202000212122020
01745	23 2 02001 12 1 22020	NAME3B	OCT	23202000112122020
01746	23 2 02005 12 1 22020	NAME4	OCT	23202000512122020
01747	23 2 02003 12 1 22020	NAME4A	OCT	23202000312122020
01750	23 2 02002 12 1 22020	NAME4B	OCT	23202000212122020
01751	46 4 46720 03 1 21220	NAME5	OCT	4644672003121220
01752	46 4 46720 02 1 21220	NAME5A	OCT	4644672002121220
01753	46 4 46720 01 1 21220	NAME5B	OCT	4644672001121220
01754	46 4 46720 05 1 21220	NAME6	OCT	4644672005121220
01755	46 4 46720 03 1 21220	NAME6A	OCT	4644672003121220
01756	46 4 46720 02 1 21220	NAME6B	OCT	4644672002121220
01757	17 7 77777 77 7 77777	COUNT	OCT	177777777777777
01760	17 7 77777 77 7 77777	COUNT1	OCT	177777777777777
01761	43 6 13065 51 2 00220	LEVEL2	OCT	4361306551200220
01762	43 6 13065 51 2 00320	LEVEL3	OCT	4361306551200320
01763	07 2 47764 15 0 14743	A2	OCT	0724776415014743

MORGAN

01764	11 3 33231 41 1 20344	A3	OCT	1133323141120344
01765	01 0 30675 72 0 26573	B2	OCT	0103067572026573
01766	01 0 30675 72 0 26573	B3	OCT	0103067572026573
01767	02 7 34000 00 0 00000	C2	OCT	0273400000000000
01770	02 7 34000 00 0 00000	C3	OCT	0273400000000000
01771	77 0 12577 77 7 77777	D2	OCT	7701257777777777
01772	77 3 02377 77 7 77777	D3	OCT	7730237777777777
01773	00 0 00000 00 0 00002	E2	OCT	2
01774	00 0 00000 00 0 00002	F3	OCT	2
01775	01776	LOCAT1	RSS	1
01776	01777	LOCAT2	RSS	1
01777	00 0 00000 50 0 01200	TAPUNIT	OCT	50001200
02000	00 0 00000 00 0 00030	TAU	DEC	24
02001	12 1 21205 12 0 10605	TIME	OCT	1212120512010605
02002	76 0 01027 50 0 00000	HATERR	SLS	MHAT
02003	76 0 01342 50 0 00000	JACERR	SLS	MOORE
02004	76 0 01006 50 0 00000	LAPERR1	SLS	LAPLAC1
02005	76 0 01014 50 0 00000	LAPERR2	SLS	LAPLAC2
02006	76 0 01274 50 0 00000	LAPERR3	SLS	LAPKIN
02007	76 0 00705 50 0 00000	READERR	SLS	READD1
02010	76 0 01137 50 0 00000	SQERR	SLS	DTHM
02011	76 0 00774 50 0 00000	VORTER1	SLS	VORTIS1
02012	76 0 01001 50 0 00000	VORTER2	SLS	VORTIS2
02013	76 0 00761 50 0 00000	WINDERR	SLS	REWIND

MT 05/11

02014	02524	MAA	LIB	MAA
02524	04231	MAC	LIB	MAC
04231	04371	MAG	LIB	MAG
04371	04423	SAB	LIB	SAB
04423	04451	SAD	LIB	SAD
04451	04535	SAH	LIB	SAH
04535	04570	SAI	LIB	SAI
04570	04611	SAJ	LIB	SAJ
04611	04666	SAR	LIB	SAR
04666	04715	VAB	LIB	VAB
04715	04745	WAB	LIB	WAB
04745	05015	WAE	LIB	WAE
05015	14655	FS0	RSS	4000
14655	24515	FS1	RSS	4000
24515	34355	FS2	RSS	4000
34355	44215	FS3	PSS	4000
44215	54055	FS4	RSS	4000
54055	63715	FS5	RSS	4000
63715	73555	FS6	RSS	4000
73555	00000		END	

8. APPENDIX C

PRINTED FIELDS FROM THE RESEARCH PROGRAM FOR O0Z 23 FEB 65

J021	-041	+12	+154	-077	-246	+045	-134	-056	-065	-022	-023	-036	-046	-194	-117	-064	-014	-034	-047	-028	-204	-044
J020	-001	+124	-114	-075	-230	-141	-044	-114	-014	-003	-054	-065	-094	-026	-030	-107	-040	-034	-025	-102	-020	-151
J019	+06	-074	-074	-016	-043	-109	-003	-074	-006	-004	-022	-134	-064	-212	-184	-030	-033	-09	-059	-003	-081	-007
J018	-004	+048	-010	-044	-010	-017	-052	+044	-032	-058	-051	-004	-019	-074	-014	-051	-016	-003	-074	-049	-106	-119
J017	-030	-124	-030	-031	-021	+019	-003	+053	-017	-158	-013	-216	-041	-181	-065	+083	-003	-019	+136	-044	-038	+058
J016	-054	-047	-041	-042	+057	+045	+030	+011	-019	-124	-011	-145	-057	-045	+107	+056	-004	-050	-049	-027	+151	-060
J015	+029	+044	-044	-047	+081	+042	-046	-045	-015	-013	-011	-039	-063	-045	-043	-081	-042	-003	-112	-247	-013	+113
J014	-050	-04	-057	-041	+061	-033	-065	-005	-005	-045	-021	-051	-022	-021	-071	-091	-079	-050	-037	-046	-071	-030
J013	-022	-056	-014	-001	-041	-025	-117	-161	+081	-040	-040	-024	-051	-047	-035	-080	-082	-017	-156	-024	-144	-022
J012	-043	-043	-117	-136	-043	-036	-033	-081	-111	-088	-189	-021	+00	-074	-072	+146	-06	-033	+095	-169	-040	-044
J011	-079	-042	-072	-075	-102	-174	-005	-046	-003	-017	-082	-045	-160	-048	-254	-073	-158	-103	-017	-213	-094	-028
J010	-050	-001	-010	-024	-177	-124	-011	-091	-171	-055	-139	-002	-084	-099	-331	-042	-001	-188	-038	-064	-042	-058
J009	-015	-015	-123	-000	-064	-125	-179	-014	-023	-054	+061	+089	-105	-161	-043	-020	-198	-220	-082	-011	-056	-047
J008	-074	-043	-066	-008	-064	-130	-084	-043	-181	-046	-190	+029	+029	-091	-245	-028	-111	-062	-05	-061	-007	+056
J007	-024	-049	-006	-100	-12	+004	-163	-166	-024	-038	-047	+083	-065	-089	-084	-003	-069	+190	+124	-032	-061	+061
J006	+014	+050	-005	-019	-025	-046	-064	+126	-090	-043	+134	-069	-072	-173	-139	-025	-054	-024	+019	+055	+009	+014
J005	-010	+028	-051	-003	-128	-016	-114	-044	-058	+124	-003	-076	-144	-044	-077	+024	-028	-056	-011	+038	+026	+003
J004	-013	-012	+04	-030	-044	+15	-126	-435	-071	+14	-218	-021	-101	-001	+095	-079	-060	-072	-02	+018	-005	-036
J003	-005	-009	-013	-008	+048	+070	+077	-023	-063	-078	+084	+074	-116	-043	-087	-038	-063	-098	-01	+007	+046	+103
J002	-004	-010	-002	-026	-006	-021	+131	-154	-014	-025	+059	-034	+030	-077	-040	-056	-031	+040	+039	+061	-041	+016
J001	-024	-014	+021	-021	+043	+07	-183	-187	-023	+040	-006	-011	+090	-084	-154	-104	+124	+047	-045	+159	-005	-439
J00	-054	-044	-034	-107	+050	-036	-125	-008	-032	+004	+040	-022	-041	-009	-050	+002	+048	+001	-051	-029	-050	-115

1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
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00Z 23 FEB 65

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

-158 -105 -027 -209 -276 +020 +163 -063 -087 +007 +008 +024 -063 -247 -205 -016 -035 -066 +061 -061 -244 -094

-095 -010 -097 -286 -326 -190 -056 +100 -056 -031 +040 -071 -150 -106 -087 -055 +005 +013 -045 -134 -019 +124

+017 -022 -234 -164 -125 -203 -036 -053 -022 -029 -179 -171 +086 +129 -055 -053 -003 -072 -027 +064 -022

-034 -013 -078 -145 -124 -069 -006 -037 -109 -071 -078 -080 -090 -135 -036 +032 -039 -023 +063 +054 -118 -129

-062 -060 -035 -120 -113 -057 -092 -057 -086 -174 -043 -149 +010 -208 -106 +041 -064 -069 -055 -002 -058 -046

+031 -072 -084 +016 -010 -060 -091 -102 -084 -146 -041 +086 +031 +010 +062 -037 -131 -215 -274 -056 +103 +037

+009 +051 -016 +005 -009 -094 -056 -057 -065 -031 -060 -108 -101 +027 -002 -157 -114 -184 -347 -136 +038 -078

-055 +034 -116 -145 -067 -212 -161 -043 -037 +018 +007 -067 -058 -084 -131 -136 -122 -104 -123 -130 -129 -059

-035 -075 -072 -141 -240 -153 -173 -196 -054 +035 -085 -023 -027 -091 -003 +053 -121 -075 +049 -086 -230 -064

+038 -048 +037 -072 -288 -100 -083 -122 +160 -042 -248 -021 +011 -118 +012 +135 -024 -114 -028 +093 -095 -091

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-039 -162 -105 -204 -365 -304 -179 -231 -285 -057 -005 -178 -115 -294 -503 -270 -122 -346 -321 -112 -130 -141

-109 -098 +047 -028 -079 -102 -186 -131 -043 -042 -084 -381 -661 -719 -413 -492 -508 -352 -196 -186 -164

-180 -138 -013 -073 -113 -065 -016 -132 +091 -023 -271 -105 -202 -388 -357 -621 -850 -625 -331 -266 -181 -082

-163 -161 -102 -179 -045 -13 -226 -209 -039 -106 -095 -002 -055 -073 -149 -372 -418 -216 -185 -14 -226 -059

-124 -096 -106 -105 -045 -068 -034 +079 -134 -141 +057 -001 -169 -298 -30 -192 -171 -231 -164 -086 -094 -068

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-059 -108 -161 -147 -074 -030 -035 -091 -154 -125 -036 -063 -193 -178 -007 +014 -135 -166 -049 -032 +016 +069

-038 -071 -101 -076 -108 -096 +040 +087 -110 -082 -068 -181 -116 -054 -132 -117 -028 -006 +013 +045 +016 -010

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1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

PROG KAT FIELD LAYER 1

PROG. 24 HOURS

00Z 23 FEB 65

A PORT OF 10000A BY TEMP LAYER 3 24 HOURS 00Z 23 FEB 65

000 101 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

J021 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
+024 +020 +028 -013 +015 +025 +020 -019 +018 +002 +018 +020 +008 +005 +007 +011 +006 +002 +003 +004 +009 +008
J020 -026 +020 +022 +024 +043 +031 +027 -013 +025 +011 +016 +025 +011 +012 +012 +011 +007 +004 +008 +012 +009 +006
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PROG KAT FIELD

LAYER 2

24 HOURS

00Z 23 FEB 65

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

J021	-019	+012	+002	+019	+006	-033	-026	-001	+041	+015	-002	-005	+004	-001	+006	-003	-014	-004	-011	-031	-022	-003
J020	+012	+010	-005	+015	+011	-019	-009	+071	-114	-024	-016	-024	-001	-009	+020	+024	+015	-003	-017	-013	-002	+003
J019	+029	+016	-001	-003	+02	-004	-06	+044	-057	-015	-018	-016	-000	-004	-035	-034	-026	-006	-014	-012	-002	-003
J018	+013	+007	-002	-016	-006	+005	+032	+061	-003	-021	-000	-002	-018	-017	+013	+016	+016	-020	-002	-003	-002	-000
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-148 -103 -043 -056 -124 -142 -028 -051 -145 -274 -205 -047 -252 -294 -043 -049 -167 -142 -023 -048 -011 -124

J003

-132 -138 -089 -052 -086 -105 -084 -165 -074 -117 -011 -098 -169 -013 -017 -102 -016 -032 -037 -061 -034 -002

J002

-051 -119 -141 -104 -006 -039 -210 -201 -001 -068 -079 -059 -055 -066 -246 -222 -132 -030 -147 -157 -091 -638

J001

-050 -084 -133 -065 -047 -063 -264 -026 -060 -098 -033 -064 -004 -081 -272 -099 -014 -098 -175 -156 -076 -123

J000

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

PROG KAT FIELD

LAYER 2

PROG.

24 HOURS

00Z 23 FEB 65

9. APPENDIX D

THE CLEAR AIR TURBULENCE FORECAST COMPUTER PROGRAM

KAT FORECAST
BEGIN STEERING PROGRAM
COMPUTES 500 TO 300 MB LAYER

	00600	ORG	6008				
		STA	TIME				
00600	20 0 01461 50 0 00000	RTJ	READD2	+	START	RTJ	READS PACKED LOWER LEVEL D FIELD INTO FS4
00601	75 4 00674 50 0 00000	RTJ	UNPCKD2	+		RTJ	UNPACKS LOWER LEVEL D FIELD INTO FS1
00602	75 4 00702 50 0 00000	RTJ	READT2	+		RTJ	READS LOWER LEVEL TEMPERATURE FIELD INTO FS4
00603	75 4 00722 50 0 00000	RTJ	UNPCKT2	+		RTJ	UNPACKS LOWER LEVEL TEMPERATURE FIELD INTO FS3
00604	75 4 00730 50 0 00000	RTJ	READD1	+		RTJ	READS PACKED UPPER LEVEL D FIELD INTO FS4
00605	75 4 00661 50 0 00000	RTJ	UNPCKD1	+		RTJ	UNPACKS UPPER LEVEL D FIELD INTO FS0
00606	75 4 00667 50 0 00000	RTJ	READT1	+		RTJ	READS UPPER LEVEL TEMPERATURE FIELD INTO FS4
00607	75 4 00707 50 0 00000	RTJ	UNPCKT1	+		RTJ	UNPACKS UPPER LEVEL TEMPERATURE FIELD INTO FS2
00610	75 4 00715 50 0 00000	RTJ	REWIND	+		RTJ	REWINDS TU 3 CH 5/6
00611	75 4 00735 50 0 00000	RTJ	REWIND1	+		RTJ	REWINDS TU 2 CH 5/6
00612	75 4 00741 50 0 00000	RTJ	PRINT	+		RTJ	PRINTS LOWER HEIGHT FIELD
00613	75 4 01274 50 0 00000	RTJ	SINF	+		RTJ	GENERATES SINE FIELD STOMS IN FS4
00614	75 4 00745 50 0 00000	RTJ	VORTIS1	+		RTJ	COMPUTES VORTICITY FIELD FROM UPPER LEVEL D FIELD STOMS IN FS5
00615	75 4 00750 50 0 00000	RTJ	VORTIS2	+		RTJ	COMPUTES VORTICITY FIELD FROM LOWER LEVEL D FIELD STOMS IN FS6
00616	75 4 00755 50 0 00000	RTJ	LAPLAC1	+		RTJ	COMPUTES LAPLACIAN OF UPPER LEVEL VORTICITY FIELD STOMS IN FS0
00617	75 4 00762 50 0 00000	RTJ	LAPLAC2	+		RTJ	COMPUTES LAPLACIAN OF LOWER LEVEL VORTICITY FIELD STOMS IN FS1
00620	75 4 00770 50 0 00000	RTJ					

00621	75 4 00776 50 0 00000	+	RTJ	HORIZ	COMPUTES AVERAGE LAPLACIAN BETWEEN UPPER AND LOWER LEVELS STOWS IN FS5
00622	75 4 01320 50 0 00000	+	RTJ	PRINT1	PRINTS LAPLACIAN OF VORTICITY
00623	75 4 01003 50 0 00000	+	RTJ	MHAT	STOWS SCALED MAP FACTOR IN FS6
00624	75 4 01011 50 0 00000	+	RTJ	UTHM1	COMPUTES U COMPONENT OF THERMAL WIND AT LOWER LEVEL STOWS IN FS0
00625	75 4 01027 50 0 00000	+	RTJ	UTHM2	COMPUTES U COMPONENT OF THERMAL WIND AT LOWER LEVEL STOWS IN FS1
00626	75 4 01045 50 0 00000	+	RTJ	DUTHM	COMPUTES U COMPONENT DIFFERENCE BETWEEN UPPER AND LOWER LEVELS STOWS IN FS0
00627	75 4 01052 50 0 00000	+	RTJ	VTHM1	COMPUTES V COMPONENT OF THERMAL WIND AT LOWER LEVEL STOWS IN FS1
00630	75 4 01070 50 0 00000	+	RTJ	VTHM2	COMPUTES V COMPONENT OF THERMAL WIND AT UPPER LEVEL STOWS IN FS2
00631	75 4 01106 50 0 00000	+	RTJ	DVTHM	COMPUTES V COMPONENT DIFFERENCE BETWEEN UPPER AND LOWER LEVELS STOWS IN FS1
00632	75 4 01113 50 0 00000	+	RTJ	DTHM	COMPUTES VERTICAL GRADIENT OF THERMAL WIND STOWS IN FS0
00633	75 4 01343 50 0 00000	+	RTJ	PRINT2	PRINTS VERTICAL GRADIENT OF VT
00634	75 4 01123 50 0 00000	+	RTJ	KAT1	HORIZ MINUS DTHM STOWS IN FS5
00635	75 4 00674 50 0 00000	+	RTJ	READD2	SEE ABOVE
00636	75 4 00702 50 0 00000	+	RTJ	UNPCKD2	SEE ABOVE
00637	75 4 00661 50 0 00000	+	RTJ	READD1	SEE ABOVE
00640	75 4 00667 50 0 00000	+	RTJ	UNPCKD1	SEE ABOVE
00641	75 4 00735 50 0 00000	+	RTJ	REWIND	REWINDS TU 3 CH 5/6
00642	75 4 00741 50 0 00000	+	RTJ	REWIND1	REWINDS TU 2 CH 5/6
00643	75 4 00745 50 0 00000	+	RTJ	SINF	SEE ABOVE

00644	75 4 01003 50 0 00000	+	RTJ	MMAT	SEE ABOVE
00645	75 4 01130 50 0 00000	+	RTJ	UGE0S1	COMPUTES U COMPONENT OF GEOSTROPHIC WIND AT UPPER LEVEL STOMS IN FS2
00646	75 4 01146 50 0 00000	+	RTJ	UGE0S2	COMPUTES U COMPONENT OF GEOSTROPHIC WIND AT LOWER LEVEL STOMS IN FS3
00647	75 4 01164 50 0 00000	+	PTJ	UGE0S	COMPUTES AVERAGE U COMPONENT STOMS IN FS2
00650	75 4 01173 50 0 00000	+	PTJ	VGE0S1	COMPUTES V COMPONENT OF GEOSTROPHIC WIND AT UPPER LEVEL STOMS IN FS3
00651	75 4 01211 50 0 00000	+	RTJ	VGE0S2	COMPUTES V COMPONENT OF GEOSTROPHIC WIND AT LOWER LEVEL STOMS IN FS3
00652	75 4 01227 50 0 00000	+	RTJ	VGE0S	COMPUTES AVERAGE V COMPONENT STOMS IN FS0
00653	75 4 01236 50 0 00000	+	RTJ	KINETIC	COMPUTES V SQUARE STOMS IN FS0 COMPUTES V SQ DIFF STOMS IN FS4
00654	75 4 01366 50 0 00000	+	RTJ	PRINT3	PRINTS KINETIC ENERGY FIELD
00655	75 4 01246 50 0 00000	+	RTJ	KAT2	STOMS PREVIOUS TERMS IN FS0
00656	75 4 01411 50 0 00000	+	PTJ	PRINT4	PRINTS PROG KAT FIELD
00657	75 4 01253 50 0 00000	+	RTJ	LAYER2	COMPUTES 300 TO 200 MB LAYER
00660	76 0 00000 50 0 00000	+	SLS		END OF STEERING PROGRAM USES OFF LINE PRINTING
00661	75 0 00000 50 0 00000	READD1	SLJ	**	
00662	12 0 01461 16 0 01436	+	LDA LDO	TIME NAME1	
00663	75 4 03707 00 0 00000	+	RTJ 00	MAG 0.0	
00664	50 0 01472 50 0 01308	HIGHD	ENI ENI	MAA 13008	
00665	50 0 43641 50 0 01465		ENI ENI	FS4 READERR	
00666	75 0 00661 50 0 00000		SLJ	READD1	
00667	75 0 00000 50 0 00000	UNPKD1	SLJ ENI	** 0.6	

00670	75 0 00672	+	SLJ	**2
	00 0 43641		00	FS4
00671	00 0 04441		00	FS0
	00 0 02453		00	2453B
00672	75 4 04341	+	RTJ	WAB
	50 0 00007		ENI	7
00673	75 0 00667		SLJ	UNPCKD1
	50 0 00000			
00674	75 0 00000	READD?	SLJ	**
	50 0 00000			
00675	12 0 01461	+	LDA	TIME
	16 0 01440		LDC	NAME2
00676	75 4 03707	+	RTJ	MAG
	00 0 00000		00	0,0
00677	50 0 01472		ENI	MAA
	50 0 01300		ENI	1300B
00700	50 0 43641		ENI	FS4
	50 0 01465		ENI	READD?
00701	75 0 00674		SLJ	READD?
	50 0 00000			
00702	75 0 00000	UNPCKD2	SLJ	**
	50 0 00000		ENI	0,0
00703	75 0 00705	+	SLJ	**2
	00 0 43641		00	FS4
00704	00 0 14301		00	FS1
	00 0 02453		00	2453B
00705	75 4 04341	+	RTJ	WAB
	50 0 00007		ENI	7
00706	75 0 00702		SLJ	UNPCKD2
	50 0 00000			
00707	75 0 00000	READT1	SLJ	**
	50 0 00000			
00710	12 0 01461	+	LDA	TIME
	16 0 01442		LDC	NAME2
00711	75 4 03707	+	RTJ	MAG
	00 0 00000		00	0,0
00712	50 0 01472	HIGHT	ENI	MAA
	50 0 01300		ENI	1300B
00713	50 0 43641		ENI	FS4
	50 0 01465		ENI	READD?
00714	75 0 00707		SLJ	READD?
	50 0 00000			
00715	75 0 00000	UNPCKD1	SLJ	**
	50 0 00000		ENI	0,0
00716	75 0 00720	+	SLJ	**2
	00 0 43641		00	FS4
00717	00 0 24141		00	FS2
	00 0 02453		00	2453B

00701	75 4 04241 50 0 00007	+	RTJ ENI	WAB 7
00721	75 0 00715 50 0 00000		SLJ	UNPKT1
00722	75 0 00000 50 0 00000	READT2	SLJ	**
00723	12 0 01461 12 0 01444	+	LDA LDQ	TIME NAME4
00724	75 4 03707 00 0 00000	+	RTJ 00	MAG 0,0
00725	50 0 01472 50 0 01300		ENI ENI	MAA 1300B
00726	50 0 04364 50 0 01465		ENI ENI	FS4 READERK
00727	75 0 00722 50 0 00000		SLJ	READT2
00730	75 0 00000 50 0 00000	UNPKT2	SLJ ENI	** 0,6
00731	75 0 00733 00 0 04364	+	SLJ 00	**2 FS4
00732	00 0 04001 00 0 02453		00 00	FS3 2453B
00733	75 4 04341 50 0 00007	+	RTJ ENI	WAB 7
00734	75 0 00730 50 0 00000		SLJ	UNPKT2
00735	75 0 00000 50 0 00000	REWIND	SLJ	**
00736	75 4 01472 00 0 11306	+	RTJ 00	MAA 11306B
00737	75 0 00735 50 0 00000	+	SLJ	REWIND
00740	75 0 01471 50 0 00000	+	SLJ	WINDERR
00741	75 0 00000 50 0 00000	REWIND1	SLJ	**
00742	75 4 01472 00 0 11206	+	RTJ 00	MAA 11206B
00743	75 0 00741 50 0 00000	+	SLJ	REWIND1
00744	75 0 01471 50 0 00000	+	SLJ	WINDERR
00745	75 0 00000 50 0 00000	SINF	SLJ	**
00746	75 4 04161 50 0 04364	+	RTJ ENI	SAI FS4
00747	75 0 00745 50 0 00000	+	SLJ	SINF

00750	75 0 00000 50 0 00000	VORTIS1	SLJ	**
00751	75 4 04235 50 0 43641	+	RTJ ENI	SAR FS4
00752	50 0 04441 50 0 53501		ENI ENI	FS0 FS5
00753	50 0 01467 50 0 04075		ENI ENI	VORTER1 SAH
00754	75 0 00750 50 0 00000		SLJ	VORTIS1
00755	75 0 00000 50 0 00000	VORTIS2	SLJ	**
00756	75 4 04235 50 0 43641	+	RTJ ENI	SAR FS4
00757	50 0 14301 50 0 63341		ENI ENI	FS1 FS6
00760	50 0 01470 50 0 04075		ENI ENI	VORTER2 SAH
00761	75 0 00755 50 0 00000		SLJ	VORTIS2
00762	75 0 00000 50 0 00000	LAPLAC1	SLJ	**
00763	75 4 04047 00 0 04441	+	RTJ 00	SAD FS0
00764	00 0 53501 00 0 01463		00 00	FS5 LAPERR1
00765	75 4 04075 50 0 04073	+	RTJ ENI	SAH SAD+24B
00766	50 0 04061 50 0 04061		ENI ENI	SAD+12B SAD+12B
00767	75 0 00762 50 0 00000		SLJ	LAPLAC1
00770	75 0 00000 50 0 00000	LAPLAC2	SLJ	**
00771	75 4 04047 00 0 14301	+	RTJ 00	SAD FS1
00772	00 0 63341 00 0 01464		00 00	FS6 LAPERR2
00773	75 4 04075 50 0 04073	+	RTJ ENI	SAH SAD+24B
00774	50 0 04061 50 0 04061		ENI ENI	SAD+12B SAD+12B
00775	75 0 00770 50 0 00000		SLJ	LAPLAC2
00776	75 0 00000 50 4 00000	HORIZ	SLJ ENI	** 0,4
00777	12 4 04441 14 4 14301	LOOP1	LDA ADD	FS0,4 FS1,4

01000	20 0 00001		ARS	1
	54 4 53501		STA	FS4,4
01001	54 4 01600	+	ISK	76008,4
	75 0 00777		SLJ	LOOPI
01002	75 0 00776		SLJ	HORIZ
	50 0 00000			
01003	75 0 00300	MHAT	SLJ	**
	50 0 00000			
01004	75 4 04214	+	RTJ	SAJ
	00 0 01462		00	HATERR
01005	50 0 43641		ENI	FS4
	50 0 63341		ENI	FS6
01006	75 4 04075	+	RTJ	SAH
	00 0 04223		00	SAJ+7B
01007	50 0 04223		ENI	SAJ+7B
	50 0 04223		ENI	SAJ+7B
01010	75 0 01003		SLJ	MHAT
	50 0 00000			
01011	75 0 00000	UTHM1	SLJ	**
	50 0 00000			
01012	75 4 04075	DIF1	RTJ	SAH
	00 0 01015		00	OUTSID1
01013	50 0 01017	+	ENI	INSID1
	50 0 01017		ENI	INSID1
01014	75 0 01011	+	SLJ	UTHM1
	50 0 00000			
01015	10 0 00000	OUTSID1	ENA	0
	20 2 04441		STA	FS0,2
01016	75 0 01012		SLJ	DIF1
	50 0 00000			
01017	12 2 43641	INSID1	LDA	FS4,2
	01 0 00001		ARS	1
01020	14 0 01434		ADD	CONST1
	20 0 01455		STA	LOCAT1
01021	26 0 01455		MUF	LOCAT1
	20 0 01455		STA	LOCAT1
01022	12 3 24141		LDA	FS2,3
	15 1 24141		SUB	FS2,1
01023	20 0 01456		STA	LOCAT2
	12 0 01435		LDA	CONST2
01024	26 2 63341		MUF	FS6,2
	26 0 01456		MUF	LOCAT2
01025	27 0 01455		QVF	LOCAT1
	27 2 24141		QVF	FS2,2
01026	20 2 04441		STA	FS0,2
	75 0 01012		SLJ	DIF1
01027	75 0 00000	UTHM2	SLJ	**
	50 0 00000			

01030	75 4 04075 00 0 01033	DIF2	RTJ 00	SAH OUTSID2
01031	50 0 01035 50 0 01035	+	ENI ENI	INSID2 INSID2
01032	75 0 01027 50 0 00000	+	SLJ	UTHM2
01033	10 0 00000 20 2 14301	OUTSID2	ENA STA	0 FS1,2
01034	75 0 01030 50 0 00000		SLJ	DIF2
01035	12 2 43641 01 0 00001	INSID2	LDA ARS	FS4,2 1
01036	14 0 01434 20 0 01455		ADD STA	CONST1 LOCAT1
01037	26 0 01455 20 0 01455		MUF STA	LOCAT1 LOCAT1
01040	12 3 34201 15 1 34001		LDA SUB	FS3,3 FS3,1
01041	20 0 01456 12 0 01435		STA LDA	LOCAT2 CONST2
01042	26 2 63341 26 1 01456		MUF MUF	FS6,2 LOCAT2
01043	27 0 01455 27 2 34001		DVF DVF	LOCAT1 FS3,2
01044	20 2 14301 75 0 01030		STA SLJ	FS1,2 DIF2
01045	75 0 00000 50 4 00000	OUTHM	SLJ ENI	** 0,4
01046	12 4 04441 15 4 14301	LOOP4	LDA SUB	FS0,4 FS1,4
01047	20 4 04441 50 0 00000		STA	FS0,4
01050	54 4 07600 75 0 01046	+	ISK SLJ	7400B,4 LOC 1
01051	75 0 01045 50 0 00000		SLJ	OUTHM
01052	75 0 00000 50 0 00000	VTHM1	SLJ	**
01053	75 4 04075 00 0 01056	DIF3	RTJ 00	SAH OUTSID3
01054	50 0 01060 50 0 01060	+	ENI ENI	INSID3 INSID3
01055	75 0 01052 50 0 00000	+	SLJ	VTHM1
01056	10 0 00000 20 2 14301	OUTSID3	ENA STA	0 FS1,2
01057	75 0 01053 50 0 00000		SLJ	DIF3

01060	12 2 43641 01 0 00001	INSID4	LDA ARS	FS4,2 1
01061	14 0 01434 20 0 01455		ADD STA	CONST1 LOCAT1
01062	26 0 01455 20 0 01455		MUF STA	LOCAT1 LOCAT1
01063	12 2 24142 15 2 24140		LDA SUB	FS2+1,2 FS2-1,2
01064	20 0 01456 12 0 01435		STA LDA	LOCAT2 CONST2
01065	26 2 63341 26 0 01456		MUF MUF	FS6,2 LOCAT2
01066	27 0 01455 27 2 24141		DVF DVF	LOCAT1 FS2,2
01067	20 2 14301 75 0 01053		STA SLJ	FS1,2 DIF3
01070	75 0 00000 50 0 00000	VTM2	SLJ	**
01071	75 4 44075 00 0 01074	DIF4	RTJ JU	SAH OUTSID4
01072	50 0 01076 50 0 01076	+	ENI ENI	INSID4 INSID4
01073	75 0 01070 50 0 00000	+	SLJ	VTM2
01074	10 0 00000 20 2 24141	OUTSID4	ENA STA	0 FS2,2
01075	75 0 01071 50 0 00000		SLJ	DIF4
01076	12 2 43641 01 0 00001	INSID4	LDA ARS	FS4,2 1
01077	14 0 01434 20 0 01455		ADD STA	CONST1 LOCAT1
01100	26 0 01455 20 0 01455		MUF STA	LOCAT1 LOCAT1
01101	12 2 34002 15 2 34000		LDA SUB	FS3+1,2 FS3-1,2
01102	20 0 01456 12 0 01435		STA LDA	LOCAT2 CONST2
01103	26 2 63341 26 0 01456		MUF MUF	FS6,2 LOCAT2
01104	27 0 01455 27 2 34001		DVF DVF	LOCAT1 FS3,2
01105	20 2 24141 75 0 01071		STA SLJ	FS2,2 DIF4
01106	75 0 00000 50 4 00000	DVTM	SLJ ENI	** 0,4
01107	12 4 24141 15 4 14301	LOOP7	LDA SUB	FS2,4 FS1,4

01110	20 4 14301 50 4 00000		STA	FS1,4
01111	54 4 07600 75 0 01107	+	ISK SLJ	76008,4 LOOP7
01112	75 0 01106 50 0 00000		SLJ	OVTHM
01113	75 0 00000 50 4 00000	DTHM	SLJ ENI	** 0,4
01114	12 4 04441 26 4 04441	LOOP8	LDA MUF	FS0,4 FS0,4
01115	20 4 04441 12 4 14301		STA	FS0,4 FS1,4
01116	26 4 14301 14 4 04441		MUF ADD	FS1,4 FS0,4
01117	75 4 04312 0 4 01466	+	RTJ SQFRR	VAB FS0,4
01118	20 4 04441 50 4 00000	+	STA	FS0,4
01121	54 4 07600 75 0 01114	+	ISK SLJ	76008,4 LOOP8
01122	75 0 01113 50 0 00000		SLJ	DTHM
01123	75 0 00000 50 4 00000	KAT1	SLJ ENI	** 0,4
01124	12 4 53501 15 4 04441	LOOP9	LDA SUB	FS5,4 FS0,4
01125	20 4 53501 50 0 00000		STA	FS5,4
01126	54 4 07600 75 0 01124	+	ISK SLJ	76008,4 LOOP9
01127	75 0 01123 50 0 00000		SLJ	KAT1
01130	75 0 00000 50 0 00000	UGEOS1	SLJ	**
01131	75 4 04075 00 0 01134	DIF5	RTJ OO	SAH OUTSID5
01132	50 0 01136 50 0 01136	+	ENI ENI	INSID5 INSID5
01133	75 0 01130 50 0 00000	+	SLJ	UGEOS1
01134	10 0 00000 20 2 24141	OUTSID5	ENA STA	0 FS2,2
01135	75 0 01131 50 0 00000		SLJ	DIF5
01136	12 4 43641 01 0 00001	INSID5	LDA ARS	FS4,2 1
01137	14 0 01434 20 0 01455		ADD STA	CONST1 LOCAT1

01140	26 0 01455		MUF	LOCAT1
	20 0 01455		STA	LOCAT1
01141	12 3 04441		LDA	FS0,3
	15 1 04441		SUB	FS0,1
01142	20 0 01456		STA	LOCAT2
	12 0 01435		LDA	CONST2
01143	26 2 63341		MUF	FS6,2
	26 0 01456		MUF	LOCAT2
01144	27 0 01455		DVF	LOCAT1
	20 2 24141		STA	FS2,2
01145	75 0 01131		SLJ	DIF5
	50 0 00000			
01146	75 0 00000	UGEOS2	SLJ	**
	50 0 00000			
01147	75 4 04075	DIF6	RTJ	SAH
	00 0 01152		00	OUTSID6
01150	50 0 01154	+	ENI	INSID6
	50 0 01154		ENI	INSID6
01151	75 0 01146	+	SLJ	UGEOS?
	50 0 00000			
01152	10 0 00000	OUTSID6	FNA	0
	20 2 34001		STA	FS3,2
01153	75 0 01147		SLJ	DIF6
	50 0 00000			
01154	12 2 43641	INSID6	LDA	FS4,2
	01 0 00001		ARS	1
01155	14 0 01434		ADD	CONST1
	20 0 01455		STA	LOCAT1
01156	26 0 01455		MUF	LOCAT1
	20 0 01455		STA	LOCAT1
01157	12 3 14301		LDA	FS1,3
	15 1 14301		SUB	FS1,1
01160	20 0 01456		STA	LOCAT2
	12 0 01435		LDA	CONST2
01161	26 2 63341		MUF	FS6,2
	26 0 01456		MUF	LOCAT2
01162	27 0 01455		DVF	LOCAT1
	20 2 34001		STA	FS3,2
01163	75 0 01147		SLJ	DIF6
	50 0 00000			
01164	75 0 00000	UGEOS	SLJ	**
	50 4 00000		ENI	0,4
01165	12 4 24141	LOOP10	LDA	FS2,4
	05 0 00003		ALS	3
01166	20 0 01455		STA	LOCAT1
	12 4 34001		LDA	FS3,4
01167	05 0 00003		ALS	3
	14 0 01455		ADD	LOCAT1

01170	20 4 24141 50 0 00300		STA	FS2,4
01171	54 4 07600 75 0 01165	+	ISK SLJ	76038,4 LOCPI1 UGE05
01172	75 0 01164 50 0 00300		SLJ	
01173	75 0 00300 50 0 00300	VGEO51	SLJ	**
01174	75 4 04075 00 0 01177	DIF7	RIJ 00	SAH OUTSID7
01175	50 0 01201 50 0 01201	+	ENI FNI	INSID7 INSID7
01176	75 0 01173 50 0 00300	+	SLJ	VGEO51
01177	10 0 00300 20 2 34301	OUTSID7	ENA STA	FS3,2
01200	75 0 01174 50 0 00300		SLJ	DIF7
01201	12 2 43641 01 0 00301	INSID7	LDA ARS	FS4,2 1
01202	14 0 01434 20 0 01455		ADD STA	CONST1 LOCAT1
01203	26 0 01455 20 0 01455		MUF STA	LOCAT1 LOCAT1
01204	12 2 04442 15 2 04440		LDA SUB	FS0+1,2 FS0-1,2
01205	20 0 01456 12 0 01435		STA LDA	LOCAT2 CONST2
01206	26 2 63341 26 0 01456		MUF MUF	FS6,2 LOCAT2
01207	27 0 01455 20 2 34001		DVF STA	LOCAT1 FS3,2
01210	75 0 01174 50 0 00000		SLJ	DIF7
01211	75 0 00300 50 0 00000	VGEO52	SLJ	**
01212	75 4 04075 00 0 01215	DIF8	RIJ 00	SAH OUTSID8
01213	50 0 01217 50 0 01217	+	ENI FNI	INSID8 INSID8
01214	75 0 01211 50 0 00700	+	SLJ	VGEO52
01215	10 0 00000 20 2 04441	OUTSID8	ENA STA	FS0,2
01216	75 0 01212 50 0 00300		SLJ	DIF8
01217	12 2 43641 01 0 00301	INSID8	LDA ARS	FS4,2 1

01220	14 3 01434 20 3 01455	ADD STA	CUNST1 LOCAT1
01221	26 3 01455 20 3 01455	MUF STA	LOCAT1 LOCAT1
01222	12 2 14302 15 2 14300	LDA SUB	FS1+1,2 FS1-1,2
01223	20 0 01456 12 0 01435	STA LDA	LOCAT2 CONST2
01224	26 2 63341 26 0 01456	MUF MUF	FS6,2 LOCAT2
01225	27 0 01455 20 2 04441	DVF STA	LOCAT1 FSO,2
01226	75 0 01212 50 0 00000	SLJ	DIF8
01227	75 0 00300 50 4 00000	SLJ ENI	** 0,4
01230	12 4 34001 05 0 00003	LDA ALS	FS3,4 3
01231	20 0 01455 12 4 04441	STA LDA	LOCAT1 FSO,4
01232	05 0 00003 14 0 01455	ALS ADD	3 LOCAT1
01233	20 4 04441 50 0 00000	STA	FSO,4
01234	54 4 07600 75 0 01230	ISK SLJ	7600B,4 LOOP11
01235	75 0 01227 50 0 00300	SLJ	VGENS
01236	75 0 00300 50 4 00300	SLJ ENI	** 0,4
01237	12 4 24141 26 4 24141	LDA MUF	FS2,4 FS2,4
01240	20 0 01455 12 4 04441	STA LDA	LOCAT1 FSO,4
01241	26 4 04441 20 0 01456	MUF STA	FSO,4 LOCAT2
01242	14 0 01455 01 0 00001	ADD AKS	LOCAT1 1
01243	20 4 04441 50 0 00300	STA	FSO,4
01244	54 4 07600 75 0 01237	ISK SLJ	7600B,4 LOOP12
01245	75 0 01236 50 0 00300	SLJ	KINETIC
01246	75 0 00300 50 4 00000	SLJ ENI	** 0,4
01247	12 4 53501 15 4 04441	LDA SUB	FS5,4 FSO,4

01250	20 4 04441 50 0 00000	STA	FS0+4
01251	54 4 07600 75 0 01247	ISK SLJ	7600B+4 LOOP13
01252	75 0 01246 50 0 00000	SLJ	KAT2
01253	75 0 00000 12 0 01446	SLJ LDA	** COUNT
01254	05 0 00001 20 0 01446	ALS STA	I COUNT
01255	22 3 01253 12 0 01437	AJPM LDA	LAYER2 NAME1A
01256	20 0 01436 12 0 01441	STA LDA	NAME1 NAME2A
01257	20 0 01440 12 0 01443	STA LDA	NAME2 NAME3A
01260	20 0 01442 12 0 01445	STA LDA	NAME3 NAME4A
01261	20 0 01444 12 0 01447	STA LDA	NAME4 LEVEL2
01262	20 0 01316 20 0 01341	STA STA	TITLE+3 TITLE1+3
01263	20 0 01364 20 0 01407	STA STA	TITLE2+3 TITLE4+3
01264	20 0 01432 12 0 01450	STA LDA	TITLE7+3 A2
01265	20 0 01306 12 0 01451	STA LDA	A1 B2
01266	20 0 01307 12 0 01452	STA LDA	B1 C2
01267	20 0 01311 12 0 01453	STA LDA	C1 D2
01270	20 0 01310 12 0 01454	STA LDA	D1 E2
01271	61 0 01305 12 0 01457	SAL LDA	E1 TAPUNIT
01272	61 0 00664 61 0 00712	SAL SAL	HIGHT HIGHT
01273	75 0 00001 50 0 00000	SLJ	START
01274	75 0 00000 10 0 77777	SLJ FNA	** 77777B
01275	20 0 00017 50 0 00000	STA	17B
01276	75 0 01302 00 0 00000	SLJ 00	**+4 0
01277	00 0 14301 00 0 63141	00 00	FS1 FS6

01300	00 0 00147			00 39	
	00 0 00135			29	
01301	00 0 00122			00 18	
	00 0 00110			00 8	
01302	75 4 04371	+		RTJ WAE	
	00 0 00100			00 0	
01303	75 4 02202	+		RTJ MAC	
	00 0 63341			00 FS6,0	
01304	75 0 01274	+		SLJ PRINT	
	77 7 63341			77 FS6,7	
01305	00 0 01460	FI		00 TAU	
	00 0 00004			00 4	
01306	13 1 11710	AI		00T 1311171047640243	
	47 6 40243				
01307	02 4 76132	PI		00T 0247613261070664	
	61 0 70664				
01310	00 1 42600	DI		00T 0014260000000000	
	00 0 00009				
01311	01 3 56000	CI		00T 0135600000000000	
	00 0 00000				
01312	00 0 00026			00 22	
	00 0 00026			00 22	
01313	20 4 34626	TITLE	BCD		LAYER 1
	65 5 12043				
01314	65 2 56543	TITLE	BCD		LAYER 1
	20 3 12066				
01315	71 6 54364	TITLE	BCD		LAYER 1
	20 2 02020				
01316	43 6 13065	TITLE	BCD		LAYER 1
	51 2 00120				
01317	75 0 01274		SLJ		PRINT
	50 0 00000				
01320	75 0 00000	PRINT1	SLJ		**
	50 0 00000				
01321	75 0 01325	+	SLJ		**+
	00 0 00000		00		0
01322	00 0 53501		00		FS5
	00 0 63341		00		FS6
01323	00 0 00047		00		39
	00 0 00035		00		29
01324	00 0 00022		00		18
	00 0 00010		00		8
01325	75 4 04371	+	RTJ WAE		
	00 0 00000		00		0
01326	75 4 02202	+	RTJ MAC		
	00 0 63341		00		FS6,0
01327	75 0 01320		SLJ		PRINT1
	77 7 63341		77		FS6,7

01330	00 1 01463	00 1 00101	TAU	1
01331	00 1 00100	00 1 00100	0CT	0
01332	00 1 00100	00 1 00100	DEC	50-1847
01333	00 1 00100	00 1 00100	0CT	0
01334	04 6 31463	14 6 31463	DEC	150-2847
01335	00 1 00126	00 1 00126	00 10	22
01336	20 6 36147	43 6 16371	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01337	61 6 52046	66 6 02546	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01340	51 6 37163	71 6 33020	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01341	43 6 13065	51 6 00120	BCD	4, LAPLACIAN OF VORTICITY LAYER 1
01342	75 1 01320	50 1 00000	SLJ	PRINT1
01343	75 1 00100	50 1 00100	SLJ	**
01344	75 1 01350	00 1 00100	SLJ	**4
01345	00 1 04441	00 1 63341	00	FS0
01346	00 1 00147	00 1 00135	00	30
01347	00 1 00122	00 1 00110	00	18
01350	75 6 04371	00 1 00000	RTJ	WAE
01351	75 6 02202	10 6 63341	RTJ	MAC
01352	75 1 01343	77 7 63341	SLJ	FS6,0
01353	00 1 01460	00 1 00001	00	PRINT2
01354	00 1 00100	00 1 00100	00	FS6,7
01355	20 1 00100	00 1 00100	0CT	TAU
01356	00 1 00100	00 1 00100	0CT	1
01357	00 6 31463	14 6 31463	DEC	0
			DEC	50-1847
			0CT	0
			DEC	250-3047

01360	00 0 00026		00 22		
	00 0 00026		00 22		
01361	20 2 56541	TITLE2	BCD	4, VERT GRAD OF VT	LAYER 1
	23 2 56751				
01362	61 6 42046	TITLE2	PCD	4, VERT GRAD OF VT	LAYER 1
	66 2 02523				
01363	20 2 02020	TITLE2	PCD	4, VERT GRAD OF VT	LAYER 1
	20 2 02020				
01364	43 6 13065	TITLE2	BCD	4, VERT GRAD OF VT	LAYER 1
	51 5 00120				
01365	75 0 01343		SLJ	PRINT2	
	50 0 00000				
01366	75 0 00000	PRINT3	SLJ	**	
	50 0 00000				
01367	75 0 01373	+	SLJ	**4	
	00 0 00000		00	0	
01370	00 0 04441		00	FS0	
	00 0 63341		00	FS6	
01371	00 0 00047		00	39	
	00 0 00035		00	29	
01372	00 0 00022		00	18	
	00 0 00010		00	8	
01373	75 4 04371	+	RTJ	WAE	
	00 0 00000		00	0	
01374	75 4 02202	+	RTJ	MAC	
	00 0 63341		00	FS6,0	
01375	75 0 01466		SLJ	PRINT3	
	77 7 63341		77	FS6,7	
01376	00 0 01460		00	TAU	
	00 0 00001		00	1	
01377	00 0 00000		00	0	
	00 0 00000				
01400	20 0 00000		DEC	50-1847	
	00 0 00000				
01401	00 0 00000		00	0	
	00 0 00000				
01402	01 4 63146		DEC	50-2847	
	31 4 63146				
01403	00 0 00026		00	22	
	00 0 00026		00	22	
01404	20 4 27145	TITLE4	BCD	4, KINETIC ENERGY	LAYER 1
	65 2 37163				
01405	20 6 54565	TITLE4	BCD	4, KINETIC ENERGY	LAYER 1
	51 6 73020				
01406	20 2 02020	TITLE4	BCD	4, KINETIC ENERGY	LAYER 1
	20 2 02020				
01407	43 6 13065	TITLE4	BCD	4, KINETIC ENERGY	LAYER 1
	51 5 00120				

01410	75 0 01366		SLJ	PRINT3	
01411	50 0 00000	PRINT4	SLJ	**	
01412	75 0 01416	+	SLJ	**4	
01413	00 0 04441		00	FSU	
01414	00 0 00047		00	FS6	
01415	00 0 00022		00	39	
01416	00 0 00010		00	18	
01417	75 4 04371	+	RTJ	WAE	
01418	00 0 00000		RTJ	MAC	
01419	75 4 02202	+	RTJ	FS6,0	
01420	75 7 01411		SLJ	PRINT4	
01421	77 7 63341		77	FS6,7	
01422	00 0 01460		00	TAU	
01423	00 0 00000		00	1	
01424	00 0 00000		00	0	
01425	00 0 00000		DEC	5D-1B47	
01426	03 1 46314		DEC	1D-1B47	
01427	00 0 00426		00	22	
01428	00 0 00426		00	22	
01429	20 4 75146	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01430	07 2 04261	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01431	23 2 06671	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01432	20 2 02020	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01433	20 2 02020	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01434	43 6 13765	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01435	51 2 00129	TITLE7	PCD	4, PROG KAT FIELD	LAYER 1
01436	75 0 01411		SLJ	PRINT4	
01437	50 0 00000		DEC	5D-1B47	
01438	20 0 00000	CONST1	DEC	5D-1B47	
01439	05 5 11512	CONST2	DEC	17637D-5847	
01440	62 5 77555	NAME1	CCF	6420200312122020	
01441	64 2 02003	NAME1A	CCF	6420200217122020	
01442	12 1 22020				

01440	64 1 0205 12 1 2202	NAME2	CCT	642020512122020
01441	64 1 0203 12 1 2202	NAME2A	CCT	642020312122020
01442	23 1 0203 12 1 2202	NAME3	CCT	232020312122020
01443	23 1 0202 12 1 2202	NAME3A	CCT	232020212122020
01444	23 1 0205 12 1 2202	NAME4	CCT	232020512122020
01445	23 1 0203 12 1 2202	NAME4A	CCT	232020312122020
01446	17 1 7777 77 1 7777	COUNT	CCT	17777777777777
01447	43 1 13065 51 1 0022	LEVEL2	CCT	4361306551200220
01450	17 1 4764 15 1 14743	A2	CCT	0724776415014743
01451	61 1 30675 72 1 26573	P2	CCT	0103067572026573
01452	02 1 34000 00 1 00000	C2	CCT	0273400000000000
01453	77 1 12577 77 1 7777	D2	CCT	7701257777777777
01454	00 1 00000 00 1 00002	F2	CCT	2
01455	01456	LOCAT1	BSS	1
01456	01457	LOCAT2	BSS	1
01457	00 1 00000 50 1 01200	TAPUNIT	CCT	50001200
01460	00 1 00000 00 1 00030	TAU	DEC	24
01461	12 1 21205 12 1 10005	TIME	CCT	1212120512010605
01462	76 1 01003 50 1 00000	HATER4	SLS	MHAT
01463	76 1 00762 50 1 00000	LAPER41	SLS	LAPLAC1
01464	76 1 00770 50 1 00000	LAPER42	SLS	LAPLAC2
01465	76 1 00661 50 1 00000	READER4	SLS	READD1
01466	76 1 01113 50 1 00000	SOERR	SLS	DTHM
01467	76 1 00750 50 1 00000	VORTER1	SLS	VORTIS1

	VERTIS2	SLS	VERTIS2	SLS	VERTIS2
0147C	76 0 00755		MAA	LIB	MAA
	50 0 00000		MAC	LIB	MAC
01471	76 0 00735		MAG	LIB	MAG
	50 0 00000		SAD	LIB	SAD
01472	02202		SAH	LIB	SAH
02202	03707		SAI	LIB	SAI
03707	04047		SAJ	LIB	SAJ
04047	04075		SAR	LIB	SAR
04075	04161		VAB	LIB	VAB
04161	04214		WAB	LIB	WAB
04214	04235		WAE	LIB	WAE
04235	04312		FS0	RSS	4000
04312	04341		FS1	RSS	4000
04341	04371		FS2	RSS	4000
04371	04441		FS3	RSS	4000
04441	14301		FS4	RSS	4000
14301	24141		FS5	RSS	4000
24141	34001		FS6	RSS	4000
34001	43641				
43641	53501				
53501	63341				
63341	73201				
73201	00000				
				END	

10. APPENDIX E

PRINTED FIELDS FROM THE CLEAR AIR TURBULENCE FORECAST

COMPUTER PROGRAM FOR 00Z 10 MARCH 65 THROUGH 12Z 13 MARCH 65

L	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
LJ021	434	598	422	290	310	342	363	365	330	311	276	215	138	064	015	013	079	203	328	400	440	491
LJ020	693	672	644	620	591	561	531	498	446	428	392	340	271	169	53	998	028	126	263	355	382	415
	693	672	644	620	591	561	531	498	446	428	392	340	271	169	53	998	028	126	263	355	382	415
	693	672	644	620	591	561	531	498	446	428	392	340	271	169	53	998	028	126	263	355	382	415
J019	694	692	671	649	617	587	557	527	497	467	437	407	377	347	317	287	257	227	197	167	137	107
J018	697	718	728	734	733	723	706	677	611	511	353	254	193	971	913	951	071	198	233	245	318	380
J017	762	706	680	655	635	615	595	575	555	535	515	495	475	455	435	415	395	375	355	335	315	295
J016	797	738	741	731	714	694	674	654	634	614	594	574	554	534	514	494	474	454	434	414	394	374
J015	801	821	826	803	778	745	714	683	652	621	590	559	528	497	466	435	404	373	342	311	280	249
J014	765	774	771	751	719	685	654	623	592	561	530	499	468	437	406	375	344	313	282	251	220	189
J013	702	693	672	643	609	575	541	507	473	439	405	371	337	303	269	235	201	167	133	99	65	31
J012	638	622	617	624	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622	622
J011	590	576	561	566	578	559	513	466	431	391	312	231	217	233	272	326	359	373	410	478	552	609
J010	586	565	564	575	583	577	545	509	447	384	331	235	229	249	283	329	360	379	416	487	584	665
J009	632	618	621	641	623	587	548	508	449	389	318	288	293	307	330	363	400	439	504	600	690	
J008	691	683	693	695	691	660	641	595	563	534	488	419	368	358	362	374	397	427	474	548	634	715
J007	737	732	735	733	734	732	704	665	632	590	546	504	461	457	455	449	447	469	527	606	685	754
J006	770	768	773	776	777	771	750	713	673	633	593	553	513	473	433	393	353	313	273	233	193	153
J005	794	795	802	809	811	806	796	779	759	712	687	668	655	645	621	606	626	675	735	788	823	
J004	810	814	820	827	834	836	836	833	822	798	773	752	730	735	725	704	694	711	746	786	820	842
J003	822	826	832	838	847	853	855	857	853	839	822	803	798	791	780	765	762	777	799	821	840	853
J002	829	834	840	844	852	860	865	870	872	867	858	843	837	824	814	808	810	819	830	838	843	848
J001	834	835	844	848	854	861	868	875	880	879	875	865	856	840	830	835	840	846	844	837	837	
LJ000	838	841	846	850	854	859	866	872	880	882	880	876	867	853	842	839	844	850	853	849	840	838
L	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121

LCWR LEVEL 2 FILE LAYER 1 24 HOURS 00Z 10 MARCH 1965

L	J019	J018	J017	J016	J015	J014	J013	J012	J011	J010	J009	J008	J007	J006	J005	J004	J003	J002	J001	LJ000	
L	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.19	1.20
LJ021	-016	+016	-032	-089	-033	+027	-002	-005	-034	-021	+029	+025	+023	+033	+011	-009	-033	+019	+057	-001	-085
LJ020	-030	-025	+022	-014	-119	-196	-007	-017	-044	-021	+035	+047	+044	-22	-013	+019	-017	+028	+065	-010	-062
J019	+016	-002	+041	+047	-033	+032	+036	+047	-033	-016	-003	-028	-042	-016	-001	+016	+035	-003	-011	+053	+035
J018	+040	+043	+015	+066	+037	-004	+026	+041	+048	+17	-028	-036	-028	-026	-004	+024	+058	-019	-080	+005	+030
J017	-014	-001	-020	-017	-004	+008	+023	+012	+003	-003	-003	-003	-003	-003	-003	-003	-003	-003	-003	-003	-003
J016	-028	-014	+014	-024	-008	+078	-015	-072	-047	-010	+004	+041	+061	-016	-054	-056	-006	+020	-023	+014	+003
J015	+031	+056	+028	-022	-036	+048	+018	-001	-025	+028	+019	+032	-015	-015	-087	-015	+042	+016	+029	+048	+013
J014	+025	+040	+021	-015	-054	-008	-008	-002	-078	-041	+103	-009	-130	-073	+040	+068	-010	-031	-005	+022	-008
J013	-011	-040	-000	+004	+014	-033	+027	+134	-010	-158	-044	+071	-015	-020	+019	+036	+033	-004	-010	-022	-050
J012	+005	+007	-030	-020	+095	-001	-073	-010	+053	+098	+073	-011	+065	+062	-034	-044	-027	+029	-001	-019	-027
J011	-013	+043	-045	-115	-015	+025	-055	-118	-014	+126	-038	-060	-062	-047	-005	+069	-023	-079	-036	+040	+043
J010	-083	-035	-054	-054	-054	+077	-003	-055	-051	-036	-082	-007	-004	-005	+056	+029	-021	-011	-004	+037	+054
J009	-072	-057	+098	+102	+037	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004	-004
J008	+011	-001	+054	-004	-011	-037	-009	-011	+048	+112	-007	-007	-007	-007	-007	-007	-007	-007	-007	-007	-007
J007	+008	+010	-037	-088	-007	+054	+021	+002	-015	-001	-023	-082	-005	+056	+033	-008	-038	-019	+000	-003	+004
J006	-038	+013	-024	-029	+019	+051	-037	-047	+075	-018	-076	+052	-017	-053	-002	-035	-025	-005	+004	+038	+012
J005	-014	+014	+025	-017	-015	-008	-011	-003	+032	+047	+015	+040	+034	-009	+028	-019	-053	-047	-009	+036	+026
J004	+004	+019	-001	-036	-037	+006	+047	+042	-014	-027	-016	-024	-007	+026	+035	+037	-007	-024	+00		

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 100 008 076 073 014 016 032 036 028 023 028 035 025 019 001 011 005 071 042 009 009 015
 1013 127 128 121 078 068 071 066 051 032 024 033 038 017 002 017 001 035 012 006 010 017
 1019 082 107 110 139 148 121 078 063 045 045 051 061 055 017 005 030 047 029 018 021 019 014
 1018 034 052 062 075 086 028 015 030 053 071 076 060 021 000 026 051 030 013 018 030 020
 1017 013 016 016 012 038 006 014 067 055 049 062 044 006 009 036 030 008 009 016 017
 1016 005 005 001 001 002 007 046 102 078 036 015 023 048 020 011 026 018 007 002
 1015 006 007 012 015 033 076 091 051 020 005 014 039 034 019 053 092 010 025 012 004 001
 1014 045 035 023 023 035 035 054 066 065 016 001 007 038 023 037 087 075 035 016 008 007 011
 1013 065 062 037 036 035 036 036 027 033 038 014 016 022 036 029 014 011 014 024 052
 1012 044 025 029 028 019 013 028 022 023 024 034 016 017 013 010 010 023 054 101
 1011 009 002 003 001 011 025 012 006 024 048 022 000 010 021 015 016 009 027 045 064 090
 1010 048 033 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037 037
 1009 094 095 075 059 055 064 077 077 088 011 083 048 030 016 018 022 022 036 079 108 078
 1008 094 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062 062
 1007 062 047 037 042 059 081 095 121 126 133 166 155 132 130 090 090 068 124 160 140 084
 1006 038 040 039 036 042 064 080 105 139 152 180 200 166 153 128 101 125 170 169 119 061
 1005 016 020 022 023 021 026 066 058 063 089 115 127 150 159 146 148 149 158 166 131 074 035
 1004 009 010 012 012 014 020 027 038 050 066 076 086 097 099 108 128 135 116 074 039 017
 1003 004 005 007 007 006 007 011 020 032 062 062 062 062 062 062 062 062 062 062 062 062 062
 1002 003 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002 002
 1001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 KINETIC ENERGY
 LAYER 1
 00Z 10 MARCH 1965
 24 HOURS
 PROG.

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	-147	-112	-134	-122	-047	-021	-145	-051	-076	-050	-022	-026	-015	-016	+003	-028	-064	-076	-005	-020	-101	-042
LJ020	-142	-191	-157	-173	-213	-191	-196	-113	-124	-075	-048	-013	-010	-049	-029	-014	-064	-027	-042	-020	-082	-043
	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	777777	
J019	-115	-152	-11	-166	-230	-176	-134	-067	-021	-067	100	077	05	-069	-036	-055	-051	-008	-030	-037	+021	+006
J018	-079	-028	-091	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	-000	
J017	-129	-132	-068	-055	-040	-056	-017	-062	-130	-080	-079	-087	-048	-143	-010	-093	-048	-022	-092	-079	-037	
J016	-049	-045	-006	+009	-044	-011	-115	-129	-122	-107	-053	-050	-029	+00	-018	-043	-124	-081	-030	-013	-007	-011
J015	+014	+39	+16	-044	-065	-022	-112	-215	105	-025	+08	-010	-061	-023	-048	-164	-034	-047	-033	+006	+041	+001
J014	-022	-016	-021	-054	-104	-074	-076	-111	-095	-112	-074	+096	-062	-172	-120	-077	-036	-047	-058	-015	+007	-031
J013	-111	-156	-110	-023	-020	-104	-024	-015	-11	-090	-069	+052	-020	-060	-051	-044	-014	+005	-018	-029	-055	-105
J012	-031	-102	-150	-034	+037	-071	-102	-140	+021	+043	+043	-055	-031	+06	+013	-077	-072	-002	-037	-087	-148	
J011	-060	-097	-146	-144	-046	-016	-111	-117	-064	+076	-028	-091	-071	-039	-059	+041	+004	-112	-078	-018	-043	-086
J010	-177	-098	-130	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	-098	
J009	-273	-226	-070	-003	-025	-054	-164	-01	-128	038888	-150	-143	-020	-011	-093	-112	-044	+019	-062	-178	-155	-079
J008	-203	-189	-079	-053	-041	-132	-140	102	-148	-086	-039	-150	-144	-107	-172	-116	-07	-044	-126	-172	-204	-127
J007	-149	-148	-166	-178	-141	-124	-139	-149	-153	-213	-186	-207	-267	-183	-110	-064	-082	-117	-162	-200	-194	-118
J006	-152	-133	-127	-130	-130	-117	-207	-263	-111	-207	-322	-211	-231	-257	-116	-143	-205	-165	-211	-230	-130	-088
J005	-102	-04	-08	-065	-069	-080	-169	-170	-135	-160	-226	-230	-247	-26	-146	-164	-200	-266	-237	-150	-097	-089
J004	-048	-017	-075	-122	-117	-055	-014	-050	-126	-161	-169	-192	-212	-143	-134	-128	-108	-252	-188	-100	-104	-088
J003	-064	-025	-054	-132	-126	-020	-069	-086	-054	-077	-103	-082	-115	-100	-089	-141	-179	-123	-114	-111	-056	-028
J002	-044	-059	-076	-068	-051	-093	-111	-130	-018	-023	-033	-036	-082	-000	-073	-120	-130	-080	-100	-040	-016	
J001	-042	-02	-019	-068	-070	-020	-070	-033	-030	-036	-070	-057	-130	-179	-106	-075	-103	-065	-083	-149	-135	
LJ000	-011	-070	-049	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	-050	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
	PREC	KAT	FILE																			

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+991	+987	+976	+974	+973	+972	+971	+970	+969	+968	+967	+966	+965	+964	+963	+962	+961	+960	+959	+958	+957	
LJ020	+907	+900	+895	+889	+885	+880	+874	+868	+862	+856	+850	+844	+838	+832	+826	+820	+814	+808	+802	+896	+890	
	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	83889438	
J019	+924	+920	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	+914	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J018	+934	+934	+932	+932	+933	+935	+931	+929	+926	+925	+924	+923	+922	+921	+920	+919	+918	+917	+916	+915	+914	
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	
J017	+938	+940	+941	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J016	+941	+944	+945	+943	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	+942	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J015	+943	+945	+944	+945	+943	+933	+936	+927	+908	+892	+878	+874	+866	+864	+850	+849	+841	+853	+867	+882	+884	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J014	+939	+935	+938	+936	+931	+927	+918	+905	+889	+877	+875	+875	+864	+864	+850	+849	+858	+870	+878	+883	+886	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J013	+930	+928	+928	+924	+926	+915	+912	+905	+891	+874	+875	+873	+866	+866	+859	+862	+871	+880	+886	+889	+891	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J012	+921	+918	+916	+918	+919	+913	+904	+898	+883	+887	+878	+867	+863	+864	+871	+877	+883	+889	+894	+899	+903	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J011	+916	+912	+909	+910	+912	+910	+902	+895	+892	+888	+877	+864	+859	+863	+872	+891	+885	+889	+897	+907	+916	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J010	+919	+916	+910	+917	+917	+916	+910	+899	+892	+886	+875	+866	+865	+867	+872	+880	+886	+891	+899	+910	+923	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J009	+930	+927	+929	+931	+929	+925	+944	+939	+933	+928	+921	+914	+905	+899	+898	+899	+899	+904	+912	+924	+936	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J008	+942	+935	+940	+940	+948	+934	+928	+922	+915	+907	+899	+890	+886	+884	+883	+886	+892	+897	+904	+915	+929	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J007	+951	+949	+947	+946	+946	+944	+944	+939	+933	+928	+921	+914	+905	+899	+898	+899	+899	+904	+912	+924	+936	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J006	+956	+954	+953	+953	+952	+948	+943	+940	+935	+929	+924	+918	+915	+915	+912	+910	+914	+923	+934	+945	+952	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J005	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	+960	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J004	+963	+963	+963	+962	+962	+962	+962	+961	+959	+956	+954	+951	+949	+947	+944	+942	+939	+937	+939	+944	+951	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J003	+964	+965	+965	+965	+965	+965	+963	+961	+959	+958	+956	+954	+952	+949	+947	+946	+948	+952	+955	+959	+961	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J002	+965	+966	+966	+967	+967	+967	+966	+964	+962	+961	+959	+956	+954	+952	+949	+947	+946	+948	+952	+955	+959	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	
J001	+965	+966	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	
LJ000	+965	+966	+966	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	+967	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	-046	-001	-087	-017	+068	+004	-042	+016	-019	-031	+037	+038	+024	+032	+030	-013	-011	+015	+082	+024	-093	-030
LJ020	-112	-036	+087	-055	-176	-039	-016	-063	-034	-037	+022	+050	+021	-18	-036	+034	-005	+041	+071	-021	-077	-009
J019	+026	+005	+103	+040	-047	+034	+110	+021	+014	+010	+019	+002	-032	-032	-069	-010	+035	+041	+000	-033	+048	+049
J018	+078																					
J017	-062	-010	-039	-004	+000																	
J016	-076	+002	+041	-005	-014	+037	+053															
J015	+050	+083	+007	-061	-006	+075	+032	+099	-027	+029	+020	+033	+032									
J014	+061	+047	+025	-001	-069	-008	+031															
J013	-012	-050	-001	+009	+000	-051	+027	+136	-037	-048	-048	+065	+032									
J012	-014	-001	-047	+007	+009	+015	+007	-033	+046	+074	+048	-001	-011	+054	+067							
J011	-034	+045	-004	-034	-063	+054	-033	-037	+025	+048	+048	-067	-064	-064	+001	+068						
J010	-030	-056																				
J009	-098	-008	+126	+140	+040																	
J008	+044																					
J007	+038	+043	-084	-124	-012																	
J006	-041	+044	+010	-077	+031	+103																
J005	-014	+022	+048																			
J004	+010	+014																				
J003	-014	-003	+003	+030	+037																	
J002	-019	-013	+003	+030	+037																	
J001	+001	+003	+006	-012	-005	+014	+020	+009	+010	+002	+035	+009	+035	-012	-079	+040	-001	-082	+031	+034	-057	-040
LJ000	+017	-016	-002	-022	-020	+013	+020	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000	+000
L	1030	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L																						
M																						

LAPLACIAN OF VORTICITY LAYER ? 24 HOURS 00Z 10 MARCH 1965

VF RT CF AF CF VI

PRG	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L0021	-232	-165	-205	-133	+017	-053	-131	-071	-080	-077	-014	-025	-022	+10	-011	-054	-066	-085	+019	+012	-109	-059
L0020	-351	-263	-158	-232	-243	-265	-188	-136	-137	-098	-028	-013	-048	-051	-028	-034	-065	-011	+049	-037	-093	-035
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L0019	-126	-066	-063	-149	-018	-163	-005	-074	-000	-096	-119	-101	-117	-048	-014	-013	-019	-073	-079	+006	+022	
L0018	+034	-014	-103	-067	-020	-012	+003	-028	-031	-033	-127	-159	-127	-084	-039	-031	-033	-019	-056	-090	-049	-026
L0017	-098	-049	-076	-031	+014	-057	-052	-022	-055	-005	-074	-096	-062	-051	-029	-045	-048	-069	-020	-041	-093	-064
L0016	-113	-025	+024	-009	-028	+004	+002	-163	-211	-103	-067	-044	-012	+10	-028	-108	-156	-103	-038	-030	-023	-010
L0015	+028	+068	+024	-089	-097	+042	-085	-254	-119	-042	-011	+005	-041	-040	-047	-144	-141	-071	-042	+009	+050	+018
L0014	+014	-028	-044	-047	-024	-093	-066	-087	-093	-127	-050	+068	-046	-150	-135	-074	-019	-054	-058	+012	+031	-043
L0013	-118	-155	-168	+029	+010	-127	-042	+067	-044	-194	-069	+041	+003	-049	-075	-033	+017	-004	-036	-042	-084	-173
L0012	-114	-081	-101	-083	+042	-045	-165	-087	+017	+036	-012	-077	-036	+030	+027	-051	-074	-004	-020	-102	-173	-236
L0011	-100	-009	-136	-154	-070	-078	-163	-163	-021	+100	-051	-137	-069	-088	-054	+034	-010	-127	-111	-040	-078	-140
L0010	-280	-168	-164	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044	-044
L0009	-389	-304	-066	-049	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124	-124
L0008	-216	-217	-084	-026	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024	-024
L0007	-113	-118	-201	-203	-044	-171	-065	-245	-320	-296	-387	-444	-322	-197	-152	-139	-177	-276	-326	-272	-149	
L0006	-123	-062	-109	-17	-051	+003	-156	-232	-105	-219	-351	-06	-435	-474	-252	-267	-328					

J021	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
J020	+456	+424	+430	+440	+440	+443	+421	+362	+300	+254	+219	+181	+138	+090	+044	+067	+166	+266	+344	+405	+453	+507
J019	+529	+520	+533	+543	+551	+542	+467	+415	+357	+317	+299	+259	+176	+078	+006	+040	+159	+248	+308	+374	+419	+461
J018	888888888888	888888	7777	6666666666	555	444	333	44	555	6666	6666	555	444	3333333	444	5555	66666	66666	66666	66666	66666	
J017	+615	+631	+642	+651	+657	+634	+569	+479	+401	+359	+321	+243	+125	+000	+921	+949	+064	+175	+251	+319	+376	+420
J016	11111111111111111111	888	777777	666	555	44	333	44	5555	6666	6666	555	444	3333333	444	5555	66666	66666	66666	66666	66666	
J015	1	11111	888	777777	666	55	44	33	333	44	5555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J014	+696	+729	+743	+744	+741	+721	+664	+568	+479	+422	+344	+226	+087	+946	+872	+900	+906	+106	+199	+277	+343	+391
J013	22222222222222222222	111	888	7777	666	55	44	33	333	44	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J012	22222222222222222222	1111	888	7777	666	55	44	33	333	44	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J011	+752	+794	+820	+819	+802	+777	+731	+648	+550	+465	+375	+257	+097	+940	+871	+893	+968	+064	+162	+264	+332	+363
J010	22	2222222222	111	888	777	666	55	44	333	44	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J009	2	22222222	1111	888	777	666	55	44	333	44	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J008	+779	+818	+846	+846	+820	+779	+725	+651	+559	+456	+365	+269	+127	+990	+922	+919	+992	+107	+209	+297	+349	+363
J007	22222222222222222222	1111	888	7777	666	55	44	33	333	44	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J006	+770	+795	+810	+804	+778	+732	+662	+586	+498	+393	+322	+266	+169	+076	+019	+012	+097	+226	+317	+357	+372	+379
J005	22222222222222222222	1111	888	7777	66666666	555	444444444444	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J004	2222222222	1111	888	777	66666666	555	4444444444	555	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	6666	
J003	+731	+737	+742	+732	+703	+651	+586	+516	+407	+296	+279	+208	+225	+150	+114	+137	+221	+308	+362	+379	+377	+395
J002	11111111111111111111	88888	777777	666	66666666	5555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	
J001	11111111111111111111	88888	777777	666	66666666	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	55555	
J000	+669	+659	+658	+655	+627	+574	+522	+460	+360	+271	+279	+311	+262	+187	+172	+219	+287	+334	+359	+371	+387	+429
	88888888888888888888	888888	777777	666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+601	+584	+583	+579	+570	+549	+506	+445	+387	+344	+327	+306	+245	+193	+205	+252	+298	+331	+351	+361	+426	+486
	88888888888888888888	88888888888888888888	77777777	666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+562	+541	+533	+533	+554	+558	+519	+464	+423	+405	+365	+281	+213	+202	+226	+266	+300	+312	+336	+402	+475	+543
	88888888888888888888	88888888888888888888	777777777777	666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+577	+548	+533	+546	+584	+578	+533	+484	+449	+431	+382	+281	+212	+216	+238	+266	+301	+326	+365	+441	+528	+606
	88888888888888888888	88888888888888888888	7777777777	666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+629	+604	+604	+619	+633	+619	+577	+537	+508	+475	+414	+315	+238	+237	+267	+287	+323	+380	+439	+508	+593	+677
	11111111111111111111	1111111111	8888888888	7777	6666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+689	+674	+682	+686	+683	+671	+645	+620	+586	+536	+467	+373	+314	+323	+347	+366	+396	+444	+507	+579	+654	+724
	111111	11111111111111111111	888888	7777	6666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+738	+728	+730	+736	+736	+724	+709	+696	+654	+596	+543	+484	+448	+446	+452	+464	+476	+501	+561	+640	+706	+758
	22222222222222222222	22222222222222222222	11111111111111111111	88888888	77777777	6666	6666666666666666	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	5555555555555555	
	+771	+767	+770	+778	+780	+773	+765	+758	+724	+672	+638	+612	+577	+549	+547	+549	+545	+567	+625	+700	+762	+801
	22222222222222222222	22222222222222222222	22222222222222222222	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	11111111111111111111	
	+795	+794	+798	+802	+808	+807	+800	+798	+787	+753	+719	+700	+674	+648	+643	+641	+636	+656	+703	+762	+810	+838
	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	
	+811	+813	+815	+820	+830	+832	+826	+828	+830	+814	+786	+764	+749	+737	+734	+734	+734	+747	+777	+813	+843	+860
	222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222222222222222	22222222					

122 10 MARCH 1965

24 HOURS

PROG.

LAYER 1

LOWER LEVEL 2 FIELD

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 +027 +021 +013 +015 +026 +018 +003 +004 +009 +017 +019 +023 +017 +010 +011 +022 +022 +011 +015 +018 +008 +005
 +043 +030 +020 +021 +020 +022 +009 +004 +015 +020 +014 +027 +029 +010 +019 +025 +023 +018 +009 +005 +009 +002
 111
 1111
 +038 +035 +020 +011 +013 +016 +027 +025 +022 +013 +026 +033 +030 +014 +015 +027 +029 +027 +015 +002 +006 +012
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 +011 +027 +023 +015 +019 +026 +028 +033 +028 +014 +031 +035 +028 +015 +010 +020 +029 +035 +024 +007 +011 +021
 111
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 +006 +016 +029 +031 +030 +025 +018 +017 +020 +033 +037 +036 +025 +011 +006 +017 +023 +029 +028 +019 +014 +014
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 +018 +020 +037 +039 +019 +009 +014 +042 +042 +030 +036 +034 +014 +015 +022 +024 +028 +030 +020 +013 +012
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 +021 +014 +012 +004 +017 +019 +030 +050 +057 +042 +015 +022 +040 +031 +028 +029 +028 +032 +028 +016 +008 +004
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 +017 +021 +026 +031 +034 +047 +046 +046 +043 +016 +010 +013 +026 +029 +031 +024 +026 +023 +012 +007 +007
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 +053 +059 +042 +020 +032 +040 +037 +031 +039 +022 +027 +017 +018 +003 +019 +022 +019 +026 +027 +017 +013 +019
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 +053 +066 +070 +041 +027 +032 +008 +008 +029 +035 +021 +015 +027 +015 +026 +017 +019 +029 +029 +030 +031 +023
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 +043 +041 +046 +062 +026 +023 +012 +012 +005 +011 +021 +023 +037 +017 +012 +028 +027 +034 +040 +027 +028 +022
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 +046 +031 +032 +033 +012 +021 +016 +009 +005 +006 +024 +040 +014 +025 +020 +04 +036 +044 +050 +057 +030 +008
 1111
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 +071 +070 +074 +081 +057 +041 +014 +014 +007 +005 +023 +051 +021 +036 +019 +017 +008 +042 +041 +041 +039 +019
 2222
 2222
 +100 +097 +096 +085 +076 +086 +085 +058 +029 +014 +014 +048 +042 +045 +019 +027 +037 +049 +043 +044 +041 +033
 2222
 2222
 +104 +109 +094 +057 +052 +086 +093 +081 +077 +050 +08 +028 +037 +034 +019 +028 +049 +052 +055 +052 +046
 222
 222
 +083 +105 +083 +046 +053 +070 +070 +074 +081 +097 +082 +053 +047 +043 +036 +047 +054 +057 +062 +056 +049 +052
 2222
 2222
 +057 +069 +075 +040 +030 +035 +051 +066 +054 +074 +074 +113 +120 +08 +086 +071 +073 +071 +068 +068 +055 +042 +051
 111
 111
 +040 +021 +056 +055 +010 +012 +021 +049 +039 +029 +054 +105 +130 +114 +088 +078 +082 +083 +070 +055 +056 +049
 111
 111
 +031 +011 +037 +059 +058 +041 +022 +036 +038 +018 +046 +032 +061 +087 +086 +074 +075 +089 +087 +081 +079 +062
 1111
 2222
 +025 +025 +024 +045 +089 +086 +059 +052 +042 +028 +018 +027 +026 +034 +065 +080 +092 +107 +124 +121 +087 +066
 111
 2222
 +006 +018 +016 +040 +032 +047 +077 +077 +064 +050 +045 +032 +035 +044 +064 +088 +111 +127 +124 +102 +089 +084
 +020 +026 +013 +017 +022 +020 +031 +068 +071 +077 +074 +080 +109 +119 +106 +091 +087 +090 +054 +054 +073 +117
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 VERT GRAD OF VT
 LAYER 1
 24 HOURS
 12Z 10 MARCH 1965

J021 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 +077 +068 +061 +050 +051 +050 +039 +027 +022 +022 +029 +033 +025 +011 +001 +022 +036 +026 +016 +008 +007 +011
 J020 +080 +077 +067 +055 +046 +046 +028 +014 +012 +012 +016 +028 +022 +004 +028 +038 +025 +024 +019 +010 +015
 J019 +055 +077 +066 +035 +045 +044 +059 +048 +023 +015 +017 +035 +048 +031 +009 +028 +058 +044 +027 +023 +015 +010
 J018 +025 +009 +039 +032 +029 +038 +056 +061 +039 +027 +043 +062 +058 +028 +003 +011 +041 +051 +032 +021 +018 +011
 J017 +015 +014 +013 +015 +011 +012 +025 +037 +035 +033 +047 +074 +079 +035 +003 +005 +026 +022 +041 +028 +013 +008
 J016 +008 +008 +001 +001 +006 +012 +021 +029 +043 +054 +032 +025 +041 +033 +048 +102 +102 +047 +011 +002 +002
 J015 +009 +017 +018 +019 +026 +044 +051 +058 +084 +076 +032 +025 +041 +033 +048 +102 +102 +047 +011 +002 +002
 J014 +028 +045 +048 +043 +053 +065 +063 +077 +097 +043 +002 +006 +028 +024 +024 +064 +079 +042 +011 +001 +001 +007
 J013 +074 +076 +059 +054 +054 +064 +069 +051 +010 +004 +001 +021 +010 +013 +036 +029 +011 +004 +003 +013 +041
 J012 +068 +044 +045 +037 +018 +011 +021 +026 +025 +030 +011 +011 +023 +002 +014 +021 +012 +008 +009 +028 +050 +077
 J011 +032 +002 +006 +003 +003 +009 +023 +025 +018 +022 +030 +035 +012 +002 +012 +014 +007 +009 +031 +057 +067 +075
 J010 +099 +046 +036 +050 +041 +035 +045 +044 +032 +024 +047 +055 +012 +006 +009 +011 +012 +028 +060 +094 +085 +081
 J009 +155 +125 +126 +089 +053 +057 +082 +096 +080 +08 +078 +080 +039 +030 +029 +030 +045 +067 +091 +112 +113 +092
 J008 +127 +122 +097 +058 +080 +048 +076 +106 +117 +124 +152 +140 +113 +105 +088 +083 +080 +084 +108 +131 +115 +080
 J007 +074 +077 +058 +043 +040 +046 +058 +077 +102 +128 +190 +246 +218 +166 +144 +122 +090 +095 +135 +146 +108 +069
 J006 +035 +041 +042 +039 +039 +042 +044 +054 +092 +115 +148 +233 +253 +202 +182 +159 +129 +141 +169 +150 +099 +057
 J005 +015 +020 +021 +019 +020 +023 +025 +036 +065 +101 +109 +135 +181 +197 +186 +184 +186 +181 +165 +120 +067 +032
 J004 +007 +009 +010 +010 +010 +012 +019 +025 +045 +060 +080 +084 +098 +118 +123 +132 +150 +142 +110 +068 +035 +015
 J003 +003 +004 +005 +007 +009 +011 +016 +018 +018 +024 +037 +040 +048 +051 +059 +063 +069 +068 +050 +029 +015 +004
 J002 +002 +002 +002 +004 +006 +006 +005 +006 +008 +010 +012 +015 +019 +023 +027 +031 +031 +026 +016 +008 +003 +000
 J001 +001 +001 +001 +002 +002 +002 +001 +001 +002 +005 +006 +006 +006 +009 +012 +015 +015 +010 +004 +001 +000 +002
 J000 +001 +001 +001 +001 +001 +002 +002 +000 +000 +000 +000 +003 +004 +003 +004 +005 +005 +004 +002 +001 +000 +001 +007
 KINETIC ENERGY 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 LAYER 1
 24 HOURS
 12Z 10 MARCH 1965

PROG KAT FIELD LAYER 1

22 10 MARCH 1965

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 -059 -011 -006 -053 -004 -058 -002 -030 -006 -011 -006 -012 -055 -002 -066 -016 -065 -031 -068 -044 -059 -025
 -081 -043 -085 -015 -082 -045 -012 -039 -044 -024 -005 -071 -073 -006 -036 -016 -080 -040 -062 -054 -002 -090
 +044 -000 -052 -078 -019 -001 +22 -055 -048 +012 -012 -015 -039 -001 019 -037 -054 -003 -007 -033 -014 -002
 +052 -054 -043 -006 -022 -025 -017 -049 -060 -042 +20 -064 -049 -002 -021 -045 -051 -061 +55 -035 -017 +047
 -030 -066 -002 -082 -050 +032 -034 -007 -017 +013 -012 -062 -020 -044 -013 -027 -001 -008 -016 -005 -005 -032
 -032 -003 -045 -034 -003 -004 -009 +018 -063 -006 -013 +080 -002 -081 -006 -005 -083 -053 -013 +008 -002 -028
 -006 -005 -028 -037 -045 -018 -017 +013 -040 -011 -018 -041 -013 -020 -025 -060 -063 -036 -014 -061 -010 -036
 +073 -041 -010 -030 -017 -001 +020 -047 -021 -069 -033 -001 +039 -051 -008 -014 -058 +032 -010 -034 -016 +005
 +088 -015 -038 -031 -011 -060 -032 -087 -047 -113 -024 -123 -077 -060 -046 -052 -043 -014 -035 -057 -038 -088
 -170 -071 -114 -081 -026 -003 -005 -007 -011 -012 -016 -074 -018 -083 -005 -041 -063 -013 -066 -013 -076 -089
 -297 -36 -128 -072 -099 +047 -057 -009 -018 -069 -022 -051 -043 -008 -027 -071 +16 -038 -028 -119 -100 -006
 -085 -014 -117 -151 -040 -051 -061 -084 -067 -036 -018 -017 -021 -011 -032 -015 -004 -044 -117 -006 -115 -015
 +027 -055 -015 -090 -146 +44 -045 -014 -011 -037 -007 +19 -024 -018 -006 -040 -010 -054 -015 -102 -053 -008
 +005 -023 -082 -109 -025 -007 -043 -091 -067 -058 -127 -058 -058 -030 -044 -028 -049 -015 -000 -004 -003
 +012 -057 -019 -136 -099 -054 -000 +022 -044 -047 -002 -093 -055 -014 -003 -004 -011 -026 -039 -036 -059 -026
 +002 -025 -005 -04 -006 -053 -013 -016 -048 -080 -094 -181 -055 -106 -016 +28 -090 -091 -039 -008 -018 -015
 -005 -003 -036 -050 -065 -077 -007 -003 -017 -031 -091 -050 +080 -002 -034 -004 -068 -086 -015 -035 -005 -017
 -009 -010 -022 -051 -080 -000 +11 -027 -005 -011 -027 -029 -047 -046 -022 -048 -078 -036 -016 -014 -019 -010
 -013 -005 -032 -009 -070 -042 -020 -054 -020 -022 -063 -031 -008 -018 -000 -004 -013 -042 -041 -009 -019 -003
 +004 -05 -021 -017 -043 -015 -002 -019 -020 -024 -028 -023 -025 -015 -019 -036 -106 -041 -027 -002 -002 -012
 +004 -006 -010 -014 -018 -029 -010 -008 -005 -044 -029 -050 -053 -007 -010 -001 -022 -029 -042 -060 -015 -051
 -018 -030 -005 -015 -018 -020 -006 -007 -002 -011 -033 -007 -057 -016 -003 -008 -037 -050 -001 -074 -027 -058
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 LAPLACIAN OF VORTICITY LAYER 2

12Z 10 MARCH 1965

24 HOURS

PAGE.

J021 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 +119 +114 +116 +034 +063 +065 +058 +033 +029 +038 +048 +052 +044 +021 +003 +031 +044 +038 +025 +007 +005 +013
 +137 +128 +118 +107 +076 +060 +064 +037 +021 +025 +029 +031 +040 +024 +000 +023 +041 +037 +039 +023 +004 +015
 J019 +074 +086 +060 +062 +066 +058 +070 +051 +020 +019 +035 +056 +053 +024 +005 +018 +053 +063 +035 +027 +016 +012
 J018 +012 +028 +024 +020 +027 +038 +062 +064 +034 +025 +059 +086 +063 +025 +005 +004 +041 +068 +035 +022 +022 +016
 J017 +010 +007 +010 +013 +009 +011 +028 +041 +036 +028 +058 +090 +092 +035 +004 +003 +029 +061 +049 +030 +018 +016
 J016 +009 +009 +000 +003 +006 +012 +021 +028 +049 +067 +059 +072 +084 +043 +016 +014 +049 +040 +076 +032 +011 +008
 J015 +006 +016 +019 +016 +028 +042 +049 +065 +097 +090 +049 +085 +088 +043 +032 +047 +104 +015 +055 +012 +004 +008
 J014 +028 +049 +053 +051 +060 +067 +071 +095 +108 +055 +009 +010 +026 +023 +022 +062 +082 +049 +018 +003 +002 +010
 J013 +113 +097 +056 +055 +052 +048 +050 +066 +057 +013 +001 +004 +023 +009 +014 +041 +031 +018 +012 +009 +016 +047
 J012 +111 +060 +037 +028 +018 +015 +029 +037 +034 +026 +009 +015 +022 +002 +018 +024 +017 +019 +024 +043 +047 +157
 J011 +055 +002 +006 +000 +007 +019 +039 +042 +034 +039 +037 +031 +010 +005 +015 +013 +026 +063 +089 +119 +165
 J010 +224 +016 +053 +075 +081 +071 +088 +089 +069 +057 +067 +054 +016 +013 +014 +021 +040 +092 +145 +129 +128
 J009 +326 +232 +187 +154 +098 +100 +145 +174 +167 +137 +125 +091 +095 +044 +034 +036 +061 +086 +125 +173 +179 +154
 J008 +249 +231 +161 +082 +050 +067 +112 +156 +189 +233 +259 +195 +133 +117 +107 +105 +106 +119 +173 +227 +264 +151
 J007 +144 +157 +120 +073 +060 +068 +078 +100 +139 +243 +324 +374 +283 +220 +217 +190 +139 +152 +229 +257 +111
 J006 +072 +089 +100 +095 +085 +081 +077 +088 +122 +150 +225 +371 +409 +349 +319 +279 +221 +232 +280 +244 +159 +095
 J005 +032 +043 +054 +059 +046 +047 +060 +075 +104 +131 +155 +227 +321 +300 +318 +306 +306 +297 +265 +189 +109 +061
 J004 +013 +018 +025 +027 +021 +023 +008 +053 +067 +094 +120 +135 +164 +192 +195 +200 +223 +220 +167 +103 +061 +032
 J003 +005 +007 +011 +019 +022 +021 +024 +033 +039 +045 +057 +065 +073 +086 +093 +093 +095 +098 +076 +048 +032 +016
 J002 +002 +002 +003 +008 +013 +013 +011 +015 +020 +021 +020 +022 +027 +038 +038 +054 +056 +033 +021 +015 +005
 J001 +001 +000 +001 +002 +002 +002 +003 +005 +010 +015 +016 +014 +013 +019 +027 +037 +041 +032 +017 +010 +005 +000
 +002 +002 +001 +001 +001 +000 +000 +000 +000 +003 +008 +012 +014 +013 +015 +017 +018 +017 +014 +011 +006 +001 +000
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 KINETIC ENERGY LAYER 2 24 HOURS 12Z 10 MARCH 1965

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 L0021 +011 +29 -052 -036 +089 +080 -028 -037 -025 +011 +031 +007 +008 +039 -015 +053 +069 -013 +038 +048 -072 -049
 L0020 -043 -003 -004 -010 +034 -009 -017 +036 -001 +002 +061 +043 -007 -033 +022 +043 -120 -163 +007 +038 -016
 J019 -019 -32 +019 +020 -057 -011 +034 +013 +023 -017 -050 +023 +047 -016 -030 -018 -017 -023 -024 +015 +066 +062
 J018 -036 -003 +023 +022 -015 +014 +048 -009 +010 +002 +008 +002 -038 -008 -009 -038 +008 +053 +011 -034 +026 +052 +005 +009
 J017 -055 +003 +042 +030 +012 +037 +014 -084 -060 +037 +046 +027 -027 -073 -026 +049 +028 -067 -065 +019 +016 -019
 J016 -022 +018 +027 -000 +000 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010
 J015 +003 +055 +007 -067 -043 -015 +010 +064 +008 -033 -033 -010 +019 +019 +019 +019 +019 +019 +019 +019 +019 +019 +019 +019
 J014 +020 +064 +004 +004 +004 +015 +045 +063 +072 +017 +017 +017 +017 +017 +017 +017 +017 +017 +017 +017 +017 +017 +017
 J013 -013 -022 +064 +071 +012 +036 -013 -058 -067 +017 +047 +041 -049 -021 +091 +091 +091 +091 +091 +091 +091 +091
 J012 -051 -065 +026 +023 -070 -001 +010 -072 -114 -023 -023 -031 +045 +048 -019 +005 +011 -018 -008 -010 -035 +019
 J011 -056 -031 +000 -053 -133 -021 +066 -047 -072 +020 +020 +020 +020 +020 +020 +020 +020 +020 +020 +020 +020 +020 +020
 J010 -036 -044 -123 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000 +000
 J009 -018 -082 -076 +043 +038 -047 +040 +038 -047 +040 +038 -047 +040 +038 -047 +040 +038 -047 +040 +038 -047 +040 +038
 J008 +033 -024 +042 +091 +053 -086 +009 +029 +015 +037 -048 -048 +010 -022 -104 -076 -032 -032 -005 -026 +024 +050
 J007 +024 +018 +000 -006 -025 -010 +017 -013 +007 +050 +001 +002 +045 -027 -156 -085 +079 +116 +55 -067 -043 +049
 J006 -018 +000 -012 -063 +018 +072 +016 +013 +023 -065 -007 +054 +006 +045 -016 -048 +064 +058 -027 -043 -011 +014
 J005 -010 -006 +02 -016 010 +070 -033 +000 +018 -038 -004 +003 +013 +054 +042 +033 +077 -048 -095 +004 +049 +006
 J004 +001 -040 +032 -001 -023 +014 -080 -082 +025 +044 +049 -003 +007 +001 +010 +001 +001 +001 +001 +001 +001 +001
 J003 +005 -023 -008 +014 +012 +002 +000 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010
 J002 +004 -000 -012 +024 +020 -028 +032 +048 -018 -011 +009 +023 +024 +035 +005 -046 +001 +015 -008 +020 -002 -013
 J001 -005 -002 +001 +010 -010 -004 -011 -036 -003 +021 +005 +002 +040 +037 -012 -021 +010 +003 -002 +061 -066 -210
 L0000 -057 -030 +011 +013 +023 +010 -002 +003 +008 +045 -077 -181 -012 +051 -018 +015 +007 +013 -003 +027 -000 -058
 L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 L LAPLACIAN CF VORTICITY LAYER 1

00Z 11 MARCH 1965

24 HOURS

PRG.

LAPLACIAN CF VORTICITY LAYER 1

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+024	+028	+030	+031	+036	+037	+034	+027	+017	+020	+016	+019	+017	+009	+013	+019	+020	+04C	+032	+019	+009	+007
LJ020	+029	+032	+033	+028	+023	+021	+033	+025	+029	+013	+002	+015	+028	+017	+016	+018	+027	+032	+034	+042	+018	+004
	111111111					111																
J019	+019	+015	+018	+016	+005	+014	+017	+008	+034	+008	+012	+017	+028	+024	+012	+013	+014	+014	+042	+049	+016	+004
	111111111																					
J018	+012	+014	+020	+020	+017	+020	+028	+028	+016	+007	+011	+019	+029	+023	+014	+017	+013	+020	+056	+047	+007	+012
	111111111																					
J017	+016	+026	+023	+020	+027	+046	+054	+017	+015	+009	+016	+024	+029	+020	+010	+022	+016	+034	+047	+020	+015	+005
	111111111																					
J016	+026	+025	+007	+004	+009	+045	+058	+037	+028	+007	+020	+026	+031	+023	+011	+021	+032	+039	+020	+014	+014	+010
	111111111																					
J015	+019	+004	+014	+015	+017	+015	+039	+038	+020	+025	+019	+018	+025	+025	+032	+032	+031	+021	+008	+012	+016	
	111111111																					
J014	+019	+025	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017	+017
	111111111																					
J013	+048	+044	+044	+044	+042	+041	+060	+068	+037	+028	+012	+012	+020	+018	+022	+018	+020	+017	+029	+034	+024	+019
	111111111																					
J012	+053	+046	+049	+051	+049	+049	+049	+044	+014	+016	+015	+016	+016	+016	+019	+014	+011	+021	+036	+026	+006	+004
	111111111																					
J011	+048	+039	+040	+007	+013	+008	+017	+040	+041	+043	+040	+024	+014	+006	+008	+011	+017	+030	+031	+026	+021	+018
	111111111																					
J010	+046	+017	+022	+050	+000	+040	+022	+041	+045	+021	+016	+025	+040	+029	+037	+023	+011	+028	+028	+022	+016	+016
	111111111																					
J009	+071	+053	+071	+062	+045	+036	+029	+027	+044	+026	+050	+040	+046	+044	+018	+038	+031	+023	+026	+024	+024	+028
	111111111																					
J008	+109	+101	+079	+042	+063	+089	+068	+038	+049	+060	+017	+044	+008	+047	+053	+049	+048	+041	+046	+042	+035	+039
	111111111																					
J007	+094	+089	+062	+056	+124	+172	+124	+077	+065	+080	+094	+053	+027	+030	+056	+072	+061	+056	+055	+043	+042	+055
	111111111																					
J006	+085	+068	+061	+073	+133	+073	+117	+085	+083	+084	+092	+123	+088	+050	+083	+086	+060	+051	+044	+045	+058	+071
	111111111																					
J005	+104	+072	+058	+040	+080	+087	+080	+073	+063	+073	+078	+096	+111	+106	+113	+097	+072	+056	+059	+072	+069	+055
	111111111																					
J004	+085	+077	+055	+045	+026	+068	+073	+057	+042	+033	+042	+044	+078	+097	+092	+090	+091	+075	+080	+080	+062	+041
	111111111																					
J003	+051	+075	+074	+066	+043	+018	+025	+032	+049	+035	+027	+024	+031	+059	+069	+059	+070	+077	+065	+057	+069	+076
	111111111																					
J002	+030	+052	+072	+074	+063	+048	+042	+027	+042	+048	+046	+035	+032	+055	+062	+046	+048	+063	+058	+067	+086	+098
	111111111																					
J001	+001	+009	+028	+041	+060	+072	+036	+032	+044	+049	+052	+054	+043	+046	+053	+053	+047	+053	+061	+087	+090	+060
	111111111																					
LJ000	+033	+025	+017	+014	+043	+043	+027	+027	+041	+044	+056	+068	+058	+060	+076	+071	+058	+043	+050	+080	+044	+061
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
	111111111																					

VERT GRAD CF VI

LAYER 1

PROG.

24 HOURS

00Z 11 MARCH 1965

00Z 11 MARCH 1965

00Z 11 MARCH 1965

LAPLACIAN CF VORTICITY LAYER 2

L J021
 L J020
 J019
 J018
 J017
 J016
 J015
 J014
 J013
 J012
 J011
 J010
 J009
 J008
 J007
 J006
 J005
 J004
 J003
 J002
 J001
 L J000
 L

1000 1 01 1 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1 13 1014 1015 1016 1017 1018 1019 1020 1021
 +030 +054 +063 +069 +036 +061 +064 +033 +019 +011 +009 +009 +009 +011 +015 +015 +015 +017 +016 +016 +016
 +009 +022 +043 +037 +012 +014 +037 +030 +021 +008 +015 +007 +004 +013 +010 +023 +012 +016 +028 +027 +022 +023
 +002 +003 +012 +013 +017 +011 +033 +044 +038 +012 +011 +014 +010 +006 +009 +016 +019 +021 +027 +021 +012
 +003 +001 +002 +005 +010 +010 +024 +041 +061 +062 +012 +004 +011 +014 +014 +024 +024 +008 +020 +027 +015
 +004 +003 +004 +008 +003 +009 +020 +021 +024 +023 +018 +01 +023 +021 +013 +016 +017 +006 +012 +022 +016 +025
 +001 +003 +012 +013 +013 +010 +016 +026 +034 +033 +015 +023 +016 +016 +017 +017 +017 +012 +012 +029
 +013 +016 +026 +011 +005 +011 +020 +023 +025 +025 +027 +016 +008 +032 +051 +052 +012 +020 +015 +019
 +042 +043 +031 +018 +021 +025 +025 +025 +027 +016 +008 +032 +051 +052 +012 +020 +015 +019
 +053 +063 +046 +034 +046 +054 +037 +028 +031 +019 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015
 +049 +053 +063 +059 +042 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028 +028
 +065 +044 +020 +032 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023 +023
 +079 +075 +068 +070 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055 +055
 +084 +084 +081 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084 +084
 +063 +066 +050 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037 +037
 +041 +047 +044 +038 +035 +015 +013 +011 +004 +007 +012 +059 +109 +104 +067 +042 +057 +052 +050 +026 +042 +035
 +036 +041 +040 +014 +013 +021 +017 +006 +007 +002 +011 +004 +004 +004 +004 +004 +004 +004 +004 +004 +004 +004
 +026 +037 +047 +035 +011 +018 +004 +007 +001 +033 +032 +019 +019 +019 +019 +019 +019 +019 +019 +019 +019 +019
 +019 +031 +043 +053 +041 +036 +024 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015 +015
 +012 +024 +036 +043 +067 +065 +053 +031 +026 +026 +012 +043 +014 +014 +014 +014 +014 +014 +014 +014 +014 +014
 +007 +098 +015 +030 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021 +021
 +015 +009 +062 +011 +004 +020 +029 +024 +027 +009 +024 +035 +024 +035 +024 +035 +024 +035 +024 +035 +024 +035
 +025 +020 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013 +013
 1000 1 01 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

VERT GRAF C.F. VI
 LAYER 2
 PRG. 6
 24 HOURS
 00Z 11 MARCH 1965

	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	
LJ021	+131	+089	+092	+093	+079	+094	+091	+066	+041	+027	+030	+044	+042	+016	+001	+009	+018	+049	+055	+022	+015	+028	
LJ020	+138	+116	+121	+094	+005	+054	+079	+070	+043	+023	+015	+025	+041	+028	+003	+010	+019	+035	+076	+068	+034	+013	
J019	+050	+081	+092	+078	+052	+038	+054	+055	+035	+026	+019	+028	+052	+040	+010	+008	+013	+037	+076	+082	+039	+005	
J018	+024	+000	+037	+079	+023	+060	+070	+070	+032	+019	+029	+049	+069	+043	+009	+002	+018	+059	+089	+065	+020	+009	
J017	+020	+032	+010	+001	+016	+006	+076	+082	+027	+010	+030	+070	+089	+051	+006	+006	+039	+085	+084	+039	+010	+003	
J016	+016	+009	+005	+013	+018	+031	+053	+066	+036	+016	+032	+065	+084	+037	+016	+021	+032	+016	+047	+012	+007	+003	
J015	+004	+012	+027	+029	+024	+017	+027	+041	+043	+039	+040	+051	+067	+053	+025	+079	+044	+070	+013	+006	+011	+012	
J014	+020	+056	+032	+020	+018	+024	+059	+062	+048	+030	+041	+067	+037	+043	+013	+081	+019	+009	+016	+023	+036		
J013	+090	+096	+070	+044	+034	+030	+061	+080	+048	+028	+012	+019	+055	+044	+000	+017	+005	+014	+028	+037	+069		
J012	+136	+073	+044	+037	+027	+016	+061	+061	+026	+008	+008	+016	+021	+010	+010	+010	+010	+011	+025	+038	+059	+092	
J011	+145	+033	+004	+001	+037	+005	+038	+079	+048	+031	+027	+027	+020	+010	+002	+005	+009	+026	+047	+058	+084	+119	
J010	+213	+082	+038	+079	+054	+069	+144	+164	+164	+097	+057	+053	+019	+002	+005	+013	+057	+092	+110	+150	+190		
J009	+331	+231	+171	+168	+067	+080	+131	+194	+194	+126	+100	+098	+053	+011	+023	+092	+171	+189	+201	+241	+250		
J008	+288	+303	+202	+111	+076	+084	+087	+085	+140	+219	+227	44	+220	+226	+167	+086	+149	+299	+327	+260	+231	+245	+210
J007	+155	+193	+142	+073	+073	+098	+074	+055	+082	+154	+232	+312	+399	+417	+352	+406	+433	+295	+194	+182	+198	+152	
J006	+086	+109	+110	+075	+061	+064	+034	+034	+048	+088	+163	+248	+361	+420	+470	+322	+169	+128	+163	+160	+104		
J005	+051	+067	+085	+072	+037	+019	+027	+038	+019	+062	+022	+138	+062	+022	+344	+298	+196	+134	+138	+156	+113	+055	
J004	+026	+050	+050	+057	+040	+027	+035	+044	+049	+061	+067	+072	+081	+027	+156	+139	+125	+127	+124	+092	+047	+021	
J003	+011	+017	+023	+035	+040	+035	+041	+046	+045	+046	+046	+046	+055	+069	+085	+078	+073	+069	+054	+030	+012	+007	
J002	+004	+006	+009	+014	+017	+017	+019	+020	+021	+022	+024	+032	+036	+034	+041	+047	+036	+025	+020	+009	+001	+005	
J001	+001	+001	+002	+003	+004	+004	+005	+007	+008	+008	+011	+014	+010	+009	+017	+025	+022	+018	+014	+009	+006	+005	
LJ000	+002	+002	+001	+001	+001	+001	+001	+003	+002	+003	+009	+016	+008	+006	+010	+016	+018	+016	+010	+008	+013	+001	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	
L	KINETIC ENERGY																						
L	LAYER 2																						
L	PRG.																						
L	24 HOURS																						
L	00Z 11 MARCH 1965																						

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 +009 +010 +026 +030 +010 +033 +045 +024 +008 +011 +013 +014 +007 +007 +001 +012 +012 +026 +031 +022 +004 +004
 +021 +019 +022 +029 +015 +007 +010 +032 +033 +008 +009 +002 +013 +007 +001 +012 +012 +026 +031 +022 +004 +004
 +024 +026 +030 +025 +019 +019 +004 +006 +003 +016 +003 +009 +016 +007 +023 +027 +020 +021 +032 +021 +006 +009
 +023 +029 +037 +020 +016 +019 +019 +023 +016 +015 +012 +012 +029 +033 +032 +022 +020 +029 +027 +024 +017 +034
 +030 +028 +020 +011 +014 +019 +030 +023 +009 +004 +018 +031 +033 +024 +013 +013 +027 +035 +028 +017 +015 +010
 +023 +019 +013 +009 +013 +021 +045 +026 +005 +006 +017 +034 +034 +020 +006 +019 +032 +038 +027 +011 +006 +009
 +010 +011 +012 +003 +007 +035 +045 +012 +014 +013 +013 +009 +037 +037 +032 +022 +029 +040 +038 +022 +009 +007 +007
 +037 +038 +032 +030 +028 +040 +026 +008 +014 +027 +033 +030 +029 +035 +044 +044 +032 +018 +010 +004 +004
 +054 +049 +039 +037 +037 +016 +022 +032 +041 +040 +046 +024 +011 +020 +029 +035 +029 +016 +007 +004 +007 +032
 +051 +038 +032 +016 +022 +012 +022 +017 +028 +051 +031 +032 +020 +018 +013 +018 +016 +016 +006 +002 +004 +005 +020
 +048 +024 +013 +020 +023 +008 +027 +029 +027 +039 +025 +045 +030 +024 +010 +027 +033 +022 +007 +013 +019 +032
 +047 +023 +068 +026 +011 +028 +052 +035 +025 +044 +039 +044 +029 +038 +020 +038 +041 +035 +022 +024 +028
 +063 +041 +012 +028 +040 +028 +007 +050 +059 +046 +035 +025 +015 +029 +049 +013 +031 +047 +043 +023 +019 +033
 +082 +072 +046 +045 +037 +037 +039 +038 +061 +044 +007 +021 +035 +033 +039 +053 +041 +020 +029 +047
 +090 +096 +082 +054 +084 +089 +069 +052 +054 +062 +065 +071 +058 +021 +023 +043 +059 +055 +041 +039 +043 +047
 +093 +114 +095 +093 +126 +104 +080 +065 +050 +057 +061 +064 +094 +082 +065 +076 +070 +052 +050 +053 +047 +042
 +079 +102 +105 +094 +084 +048 +037 +071 +064 +059 +047 +055 +094 +115 +108 +104 +084 +063 +064 +062 +049 +044
 +063 +074 +091 +075 +034 +037 +023 +025 +040 +056 +053 +058 +063 +073 +075 +079 +082 +083 +084 +066 +055 +056
 +054 +064 +073 +079 +046 +033 +051 +039 +030 +039 +061 +055 +060 +079 +069 +054 +065 +083 +078 +066 +075 +083
 +036 +055 +063 +070 +082 +077 +067 +035 +041 +048 +081 +100 +132 +152 +110 +073 +082 +080 +068 +080 +112 +110
 +014 +030 +041 +045 +084 +093 +058 +035 +044 +074 +117 +159 +162 +134 +123 +089 +099 +105 +108 +118 +105 +079
 +012 +009 +014 +039 +043 +044 +052 +049 +044 +079 +122 +092 +039 +098 +077 +085 +035 +113 +124 +088 +039 +088
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 VERT GRAL. CF VI LAYER 1 PREG. 24 HOURS 12Z 11 MARCH 1965

L 1001 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 LJ021 +046 +041 +042 +047 +041 +065 +060 +083 +057 +035 +020 +016 +014 +019 +001 +032 +013 +046 +061 +035 +025 +016
 LJ020 +072 +066 +071 +096 +102 +059 +037 +076 +084 +044 +016 +012 +016 +020 +006 +002 +019 +028 +070 +065 +023 +007
 J019 +038 +048 +049 +073 +084 +025 +021 +037 +067 +052 +016 +009 +025 +031 +009 +002 +019 +031 +072 +070 +022 +004
 J018 +023 +036 +038 +010 +036 +007 +018 +024 +057 +054 +026 +022 +043 +033 +010 +003 +012 +060 +075 +040 +019 +008
 J017 +025 +024 +007 +001 +005 +012 +021 +064 +057 +036 +032 +043 +051 +031 +007 +009 +052 +095 +053 +011 +005 +005
 J016 +011 +003 +001 +003 +001 +005 +061 +088 +039 +018 +027 +048 +060 +045 +012 +024 +010 +091 +028 +003 +001 +001
 J015 +009 +004 +010 +017 +004 +029 +091 +057 +013 +010 +019 +009 +054 +045 +044 +057 +081 +052 +021 +005 +002 +004
 J014 +014 +027 +031 +021 +016 +045 +067 +025 +010 +014 +012 +021 +044 +030 +031 +032 +046 +032 +015 +005 +003 +009
 J013 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011
 J012 +076 +072 +072 +046 +043 +035 +002 +000 +008 +023 +021 +011 +017 +016 +015 +011 +007 +006 +006 +027
 J011 +093 +055 +023 +009 +010 +092 +009 +051 +060 +033 +019 +010 +018 +025 +008 +031 +018 +015 +019 +049 +107 +142
 J010 +138 +079 +009 +008 +011 +017 +068 +107 +103 +073 +049 +042 +047 +028 +001 +039 +043 +076 +101 +114 +126
 J009 +167 +145 +074 +042 +035 +021 +030 +074 +135 +142 +117 +080 +050 +062 +059 +026 +038 +094 +119 +103 +100 +123
 J008 +151 +161 +120 +080 +054 +053 +059 +059 +061 +110 +123 +102 +103 +096 +102 +111 +102 +108 +115 +126 +131
 J007 +108 +139 +107 +099 +103 +047 +065 +046 +066 +093 +112 +141 +175 +203 +201 +183 +133 +093 +134 +175 +158 +119
 J006 +067 +103 +103 +082 +090 +078 +048 +042 +065 +094 +113 +134 +170 +232 +267 +227 +175 +159 +206 +222 +155 +094
 J005 +040 +061 +079 +069 +054 +035 +033 +046 +048 +063 +086 +099 +118 +162 +209 +225 +226 +239 +240 +187 +111 +059
 J004 +022 +032 +042 +048 +037 +029 +032 +031 +025 +027 +049 +053 +069 +093 +122 +156 +184 +197 +173 +113 +061 +030
 J003 +011 +017 +023 +028 +027 +029 +027 +016 +010 +011 +015 +023 +030 +041 +059 +079 +099 +104 +083 +052 +026 +011
 J002 +005 +008 +012 +015 +018 +020 +015 +006 +003 +004 +005 +009 +010 +012 +021 +034 +041 +032 +018 +006 +002
 J001 +002 +003 +005 +007 +009 +005 +006 +002 +001 +001 +001 +002 +005 +004 +002 +007 +011 +013 +012 +008 +004 +002 +001
 LJ000 +009 +011 +002 +003 +004 +004 +003 +003 +003 +003 +003 +003 +003 +002 +002 +003 +002 +003 +002 +001 +001 +001 +001
 L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 KINETIC ENERGY
 LAYER 1
 24 HOURS
 12Z 11 MARCH 1965

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	-100	-026	+035	-024	-082	+018	+066	-016	-041	-015	-019	-019	+026	+010	-017	+011	-015	-061	+010	+024	-041	+017
LJ020	+045	+024	-010	-025	-070	-013	+055	+024	-026	-012	+026	+004	+005	+006	-032	+008	+036	-021	-026	+025	+019	-032
J019	+085	-012	-056	+056	+044	-016	-051	+051	+043	-037	-045	+036	+061	+006	-005	-007	+012	-033	-024	+095	+061	
J018	-099	-001	+036	+022	+055	+040	-067	+010	+111	-029	-089	+031	+005	-011	+052	+031	-076	-054	-016	-025	+035	+081
J017	-097	+019	+088	-070	-112	+066	+076	-018	-043	-005	+026	+022	-034	-067	+006	-027	-037	+009	+060	-003	-062	-027
J016	+043	+050	+017	-052	-084	+031	+124	-034	-128	+011	+057	+010	-005	-025	-058	-078	-017	+106	+091	-013	-033	-018
J015	+006	+044	-021	-031	+017	+034	-043	-085	-082	+022	-015	-017	+002	+050	-028	-042	-050	+055	+005	-061	-003	+091
J014	+000	+017	+023	-001	+046	+066	-085	-085	+100	+053	-032	+031	+008	-034	+023	-046	-012	-014	-019	-007	+011	+004
J013	+070	-007	-044	+021	+060	+034	-043	+001	+104	+008	-091	+099	+073	-087	-038	+071	-012	-027	+038	+119	+060	-138
J012	-032	+004	-016	-010	-001	-012	+001	+071	-002	-128	-021	+060	-017	-017	-011	-022	-005	+029	-012	-006	-016	+024
J011	-102	-036	+072	-044	-107	-012	+052	-045	-094	-147	-016	+007	-078	-012	+007	+073	+068	+050	-034	-186	-092	+129
J010	+002	-121	-138	-046	-031	+010	-013	-036	-021	-009	-041	-025	+073	+036	-002	+045	-016	-081	-012	+097	+014	-068
J009	+029	-105	-104	+018	+098	-038	-032	-008	+000	+102	-027	-070	+065	+092	-030	-084	-167	-073	+083	+156	+019	-101
J008	+034	-013	+098	+011	-115	-138	+022	+076	-003	-010	+062	+006	-047	-064	-098	-050	+032	+087	+067	-047	-089	+002
J007	+087	+043	-121	-013	-019	-042	+049	+073	-047	-072	-087	+054	+062	-101	-153	+083	+158	-054	-060	+014	-009	-028
J006	+033	+068	-146	-104	+137	+106	+022	+014	-058	+009	-071	-019	+086	+064	+028	+035	-042	-209	-154	+087	+094	-017
J005	-042	+068	-045	-121	-032	+105	-016	-062	+023	+039	+026	+007	-007	+051	+076	+017	-034	-072	-067	+028	+041	+013
J004	-007	+017	+040	-007	-041	-038	-039	-001	+016	-005	+030	+080	-023	-025	+003	+047	+048	+030	+057	+036	-004	-007
J003	+022	-015	-081	+073	-015	-103	-017	+058	-002	-034	+004	-005	-063	-023	-002	-004	+010	+015	+033	-018	-004	+018
J002	-006	+004	+003	+014	-005	+003	+033	+020	-014	-028	+008	+008	+011	+028	-000	-017	-004	+007	+001	-034	-047	+009
J001	+010	+006	-007	-010	+024	+027	+000	-011	-016	+013	+020	+020	+039	+030	+009	-002	-000	+013	+012	-010	-043	-057
LJ000	+013	-018	-023	+013	+001	-018	+003	+005	-003	+004	+038	-011	-133	-060	+029	-012	+036	+016	+011	+019	-002	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L																						

122 11 MARCH 1965

24 HOURS

PRG.

LAPLACIAN OF VELOCITY LAYER 2

24 HOURS

12Z 11 MARCH 1965

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 LJO21 +040 +044 +043 +035 +064 +056 +032 +034 +019 +012 +011 +010 +012 +010 +023 +020 +012 +012 +010 +005 +015 +011
 LJO20 +017 +037 +046 +033 +035 +026 +032 +035 +029 +010 +007 +012 +006 +020 +028 +028 +020 +014 +015 +016 +019 +009
 J019 +007 +010 +029 +077 +012 +063 +048 +033 +032 +025 +013 +016 +012 +016 +006 +020 +016 +010 +013 +019 +021 +006
 J018 +001 +003 +012 +019 +002 +007 +010 +027 +046 +034 +008 +011 +009 +014 +026 +021 +016 +022 +026 +020 +011 +014
 J017 +004 +002 +009 +016 +004 +011 +009 +039 +041 +031 +010 +011 +021 +023 +017 +015 +021 +024 +022 +019 +011 +019
 J016 +003 +003 +008 +018 +014 +002 +025 +052 +039 +021 +009 +019 +030 +015 +002 +012 +017 +014 +015 +004 +026 +023
 J015 +010 +005 +009 +012 +009 +022 +054 +062 +023 +005 +005 +004 +025 +043 +024 +010 +017 +020 +022 +012 +025 +011
 J014 +014 +002 +019 +007 +024 +069 +047 +022 +013 +007 +004 +036 +025 +037 +022 +018 +020 +015 +008 +016 +006
 J013 +021 +036 +049 +040 +022 +037 +043 +036 +023 +009 +029 +013 +012 +009 +026 +023 +033 +039 +016 +027 +002
 J012 +048 +063 +063 +057 +042 +022 +007 +010 +008 +022 +012 +008 +012 +017 +021 +035 +042 +031 +017 +038
 J011 +049 +054 +053 +045 +044 +013 +017 +022 +067 +013 +006 +022 +012 +014 +006 +013 +019 +018 +029 +016 +034 +058
 J010 +072 +064 +045 +011 +045 +021 +042 +060 +040 +023 +012 +013 +014 +016 +003 +011 +023 +028 +036 +046 +044
 J009 +080 +087 +084 +069 +063 +031 +033 +054 +009 +071 +074 +063 +036 +012 +017 +008 +021 +032 +038 +040 +034 +036
 J008 +066 +075 +093 +107 +062 +033 +046 +037 +030 +040 +062 +073 +080 +065 +024 +035 +030 +021 +032 +034 +033 +040
 J007 +046 +055 +055 +055 +058 +042 +030 +010 +013 +010 +013 +010 +013 +010 +013 +010 +013 +010 +013 +010 +013 +010 +013
 J006 +036 +037 +036 +016 +001 +000 +011 +000 +034 +001 +030 +030 +031 +064 +094 +059 +034 +027 +044 +070 +065 +046
 J005 +031 +032 +042 +037 +012 +009 +005 +038 +044 +028 +048 +047 +026 +035 +067 +068 +050 +052 +067 +078 +067 +040
 J004 +023 +025 +034 +049 +042 +018 +038 +054 +028 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010 +010
 J003 +011 +020 +026 +038 +046 +048 +054 +028 +012 +016 +018 +029 +021 +006 +020 +045 +062 +067 +062 +049 +028 +016
 J002 +002 +003 +018 +026 +032 +035 +020 +007 +019 +011 +010 +027 +020 +026 +008 +021 +037 +039 +055 +012 +030 +048
 J001 +005 +002 +004 +011 +016 +012 +007 +015 +017 +014 +023 +038 +031 +031 +030 +021 +011 +005 +003 +034 +038 +033
 LJ000 +018 +009 +011 +008 +007 +004 +003 +007 +017 +018 +038 +058 +022 +045 +048 +011 +011 +020 +033 +029 +017 +042
 L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 VERT GRAF CF VT LAYER 2 PRG. 24 HOURS 12Z 11 MARCH 1965

Layer	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+061	+055	+056	+069	+073	+065	+072	+094	+084	+051	+029	+019	+015	+013	+003	+002	+020	+057	+066	+034	+025	+017
LJ020	+121	+092	+087	+111	+114	+108	+064	+085	+107	+064	+028	+020	+020	+021	+006	+001	+014	+042	+074	+062	+024	+005
J019	+068	+071	+085	+083	+088	+042	+024	+043	+093	+078	+024	+013	+027	+033	+011	+001	+015	+043	+073	+078	+030	+003
J018	+033	+051	+045	+015	+006	+012	+023	+035	+072	+076	+033	+021	+045	+038	+011	+001	+013	+065	+074	+053	+034	+010
J017	+032	+029	+006	+000	+033	+000	+035	+080	+068	+037	+037	+051	+068	+038	+006	+003	+052	+103	+056	+014	+013	+009
J016	+016	+003	+004	+003	+031	+007	+070	+101	+037	+015	+033	+059	+074	+052	+013	+018	+100	+102	+026	+004	+005	+005
J015	+200	+005	+012	+004	+002	+008	+085	+051	+017	+017	+028	+045	+058	+048	+036	+047	+089	+069	+019	+009	+013	+011
J014	+014	+034	+034	+018	+014	+042	+036	+019	+013	+028	+023	+031	+053	+031	+023	+050	+052	+040	+024	+015	+011	+014
J013	+065	+080	+064	+051	+038	+031	+027	+020	+038	+034	+032	+006	+021	+022	+014	+011	+016	+017	+015	+025	+058	+127
J012	+120	+094	+050	+050	+039	+011	+011	+041	+076	+034	+032	+017	+033	+034	+014	+005	+019	+016	+030	+082	+158	+191
J011	+178	+080	+027	+008	+011	+074	+008	+057	+093	+057	+024	+017	+033	+034	+014	+005	+019	+016	+030	+082	+158	+191
J010	+266	+142	+023	+024	+039	+000	+072	+059	+145	+174	+110	+068	+071	+060	+028	+003	+008	+061	+133	+172	+166	+183
J009	+334	+265	+136	+094	+059	+064	+057	+100	+100	+190	+089	+140	+099	+090	+080	+003	+062	+157	+198	+150	+141	+195
J008	+277	+293	+186	+122	+094	+097	+106	+101	+112	+134	+178	+210	+202	+178	+041	+158	+169	+149	+155	+155	+185	+217
J007	+190	+255	+170	+122	+158	+164	+111	+078	+104	+128	+149	+207	+300	+359	+332	+278	+179	+111	+186	+256	+243	+191
J006	+117	+195	+190	+128	+134	+121	+071	+059	+094	+133	+153	+172	+230	+367	+421	+343	+255	+219	+315	+346	+235	+144
J005	+069	+116	+163	+125	+082	+050	+044	+042	+068	+090	+117	+124	+139	+204	+285	+329	+355	+383	+386	+291	+166	+093
J004	+040	+060	+090	+102	+065	+041	+046	+050	+043	+044	+057	+070	+080	+103	+148	+209	+277	+318	+275	+167	+089	+050

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+438	+416	+399	+401	+396	+396	+398	+382	+321	+219	+121	+078	+079	+052	+985	+956	+976	+987	+069	+266	+430	+507
LJ020	+511	+502	+497	+510	+529	+536	+526	+500	+441	+310	+155	+10	+124	+095	+015	+959	+933	+944	+065	+258	+397	+464
	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	
J019	+592	+600	+611	+640	+669	+670	+648	+600	+514	+387	+254	+190	+161	+089	+006	+948	+941	+019	+176	+328	+399	+411
J018	+662	+678	+701	+741	+764	+756	+723	+663	+565	+440	+330	+247	+154	+051	+976	+930	+959	+107	+291	+394	+400	+384
J017	+715	+737	+765	+794	+772	+739	+672	+567	+445	+347	+256	+130	+006	+926	+901	+975	+147	+329	+414	+403	+381	
J016	+748	+767	+782	+787	+757	+719	+693	+632	+529	+428	+356	+275	+137	+994	+903	+905	+029	+204	+339	+401	+403	+395
J015	+755	+762	+762	+744	+705	+652	+600	+550	+489	+421	+365	+300	+173	+025	+961	+002	+117	+249	+336	+381	+408	+427
J014	+739	+730	+725	+698	+648	+577	+506	+462	+432	+400	+364	+324	+226	+089	+053	+116	+186	+253	+315	+372	+425	+468
J013	+705	+674	+662	+640	+581	+510	+462	+423	+391	+371	+343	+323	+276	+191	+149	+167	+203	+253	+314	+376	+445	+513
J012	+659	+616	+594	+574	+537	+501	+478	+449	+422	+379	+315	+295	+292	+257	+210	+181	+187	+224	+286	+372	+471	+558
J011	+623	+576	+548	+533	+529	+524	+511	+493	+474	+413	+312	+273	+290	+270	+226	+201	+181	+165	+215	+349	+489	+589
J010	+616	+561	+521	+522	+535	+540	+535	+518	+497	+447	+343	+287	+307	+297	+262	+235	+192	+158	+199	+326	+477	+602
J009	+637	+587	+552	+537	+541	+553	+559	+547	+532	+502	+425	+367	+358	+338	+317	+286	+234	+221	+257	+337	+471	+614
J008	+680	+644	+614	+587	+576	+579	+584	+593	+598	+589	+548	+491	+451	+419	+398	+377	+337	+324	+347	+401	+511	+637
J007	+729	+701	+679	+657	+644	+636	+632	+648	+666	+665	+639	+603	+572	+540	+518	+488	+444	+431	+453	+498	+585	+683
J006	+767	+747	+736	+724	+716	+715	+716	+716	+722	+718	+700	+694	+678	+643	+621	+583	+527	+520	+551	+592	+661	+738
J005	+794	+783	+778	+778	+776	+778	+782	+781	+779	+778	+771	+770	+760	+731	+705	+669	+626	+615	+636	+673	+726	+782
J004	+815	+808	+808	+814	+819	+817	+821	+831	+837	+839	+837	+831	+823	+806	+780	+747	+720	+709	+717	+741	+779	+816
J003	+829	+826	+829	+836	+845	+851	+858	+869	+877	+878	+876	+871	+862	+847	+827	+802	+784	+780	+785	+797	+820	+842
J002	+838	+838	+842	+850	+861	+873	+882	+889	+894	+897	+895	+890	+880	+866	+851	+838	+831	+829	+831	+836	+845	+856
J001	+843	+844	+849	+857	+868	+874	+889	+896	+900	+901	+899	+894	+885	+873	+860	+855	+856	+857	+857	+857	+856	+860
LJ000	+845	+847	+852	+860	+869	+878	+887	+895	+898	+897	+894	+890	+885	+874	+860	+858	+865	+868	+868	+868	+864	+863
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L	LOWER LEVEL 2 FIELD																					
M																						

00Z 12 MARCH 1965
24 HOURS
PRUG.

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+026	+013	+016	+017	+012	+011	+013	+027	+021	+006	+012	+014	+007	+011	+013	+007	+016	+030	+017	+009		
LJ020	+036	+040	+039	+034	+032	+027	+025	+034	+034	+011	+021	+008	+012	+010	+009	+015	+009	+026	+021	+003		
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J019	+032	+044	+056	+054	+042	+032	+027	+024	+035	+036	+018	+009	+012	+014	+020	+024	+016	+021	+028	+025	+013	+005
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J018	+036	+043	+047	+037	+023	+011	+003	+008	+036	+009	+013	+007	+017	+026	+025	+019	+014	+031	+038	+025	+007	+003
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J017	+036	+035	+034	+028	+019	+013	+006	+024	+030	+016	+012	+016	+022	+022	+013	+007	+027	+043	+039	+018	+005	+005
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J016	+026	+021	+008	+025	+012	+023	+034	+021	+009	+016	+002	+027	+029	+018	+002	+007	+037	+048	+031	+008	+003	+004
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J015	+004	+011	+036	+033	+031	+043	+050	+027	+005	+009	+010	+030	+040	+029	+012	+023	+042	+044	+021	+002	+002	+003
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J014	+031	+043	+039	+045	+041	+059	+038	+021	+012	+003	+010	+015	+035	+030	+018	+023	+035	+036	+024	+008	+003	+005
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J013	+050	+047	+025	+012	+035	+046	+012	+023	+011	+012	+023	+023	+023	+022	+016	+025	+029	+020	+020	+016	+011	+012
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J012	+051	+034	+026	+009	+026	+037	+033	+030	+012	+038	+031	+042	+023	+014	+029	+037	+026	+016	+008	+012	+027	+022
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J011	+052	+023	+023	+028	+013	+025	+040	+031	+027	+058	+041	+033	+043	+036	+027	+046	+014	+015	+013	+031	+037	+028
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J010	+062	+025	+006	+024	+026	+015	+032	+022	+030	+067	+071	+020	+059	+047	+010	+017	+018	+023	+027	+042	+041	+029
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J009	+081	+046	+008	+008	+027	+043	+019	+013	+025	+057	+086	+082	+044	+046	+003	+020	+006	+018	+029	+039	+047	+046
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J008	+102	+067	+032	+018	+081	+038	+045	+027	+003	+046	+076	+060	+079	+052	+046	+036	+025	+014	+024	+032	+043	+051
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J007	+113	+113	+079	+054	+052	+041	+076	+062	+064	+068	+067	+081	+094	+070	+055	+040	+016	+026	+042	+044	+046	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J006	+106	+140	+123	+096	+114	+129	+112	+082	+077	+091	+074	+059	+066	+059	+069	+072	+057	+039	+048	+057	+052	+053
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J005	+085	+111	+120	+113	+116	+113	+086	+056	+053	+058	+079	+069	+047	+024	+050	+083	+081	+075	+078	+074	+068	+066
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J004	+060	+076	+093	+107	+081	+067	+067	+050	+023	+006	+051	+062	+050	+045	+047	+075	+102	+101	+086	+075	+062	
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J003	+044	+077	+105	+116	+092	+057	+036	+029	+017	+011	+035	+056	+077	+087	+071	+058	+073	+085	+079	+075	+073	+069
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J002	+035	+059	+088	+095	+097	+068	+053	+014	+022	+030	+047	+083	+104	+105	+109	+083	+065	+073	+061	+060	+083	+100
	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
J001	+030	+038	+027	+028	+068	+073	+074	+073	+054	+045	+071	+092	+079	+072	+098	+114	+094	+077	+062	+062	+071	+053
LJ000	+035	+042	+062	+038	+025	+056	+072	+082	+073	+067	+076	+033	+006	+004	+025	+077	+088	+065	+056	+037	+025	+076
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
M																						

VERT GRAO OF VI

PRGG.

24 HOURS

00Z 12 MARCH 1965

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
-026 -103 -107 -059 -070 -089 -084 -061 -075 -075 -043 -038 -002 +034 -055 -040 +030 -047 -153 -132 -074 -019
-083 -195 -133 -158 -132 -193 -111 -086 -027 -080 -140 -106 +022 +036 -016 +005 -014 -130 -199 -134 -064 +044
-074 -084 -124 -105 -083 -191 -054 -164 -033 -105 -050 -026 +015 -025 -023 -044 -097 -141 -074 -002 -000
-046 -100 -125 -061 -037 -014 -019 -014 -076 -093 -042 +005 -039 -184 -020 -003 -045 -123 -036 +020 -029 -041
-051 -166 -044 -025 -020 +004 -006 -051 -085 -188 -052 -039 -086 -078 -026 -013 -134 -238 -086 +056 -021 -039
-021 -034 +028 +036 -102 -100 +018 -048 -125 -088 -040 -057 -094 -037 -037 -132 -160 -229 -061 -005 -016 -024
+006 -006 -050 -067 -072 -084 -184 -097 -015 +028 -012 +019 -083 -211 -119 +023 -029 -106 -087 -037 -002 -019
-042 -134 -060 -101 -021 -184 -097 -015 +028 -012 +019 -083 -211 -119 +023 -029 -106 -087 -037 -002 -019
-086 -174 -066 -023 -059 -184 -097 -015 +028 -012 +019 -083 -211 -119 +023 -029 -106 -087 -037 -002 -019
-151 -137 -067 +001 -045 -084 -020 -080 -016 -149 -133 -068 +005 +124 +010 -087 -082 +007 -006 -070 -084 -085
-191 -081 -087 -076 -004 +146 -026 -036 +043 -049 -162 -102 -001 -029 -098 +004 +062 -14 -257 -150 -034 -095
-196 -136 -111 -058 +050 +003 -040 -033 -046 -158 -240 -202 +028 -007 -110 +028 +040 135 -237 -210 -148 -145
-248 -221 -28 -049 -079 -073 +040 -062 -132 -184 -300 -289 -071 -124 -078 -063 -159 -108 -068 -262 -341 -164
-263 -223 -126 -118 -124 -118 -066 -092 -066 -088 -142 -294 -274 -461 -148 -165 -134 -149 -279 -318 -190
-200 -211 -202 -191 -131 -195 -296 -168 -079 -109 -117 -192 -238 -238 -223 -181 -142 -118 -188 -267 -243 -212
-167 -213 -196 -224 -232 -191 -171 -151 -093 -146 -252 -143 -119 -221 -158 -213 -353 -215 -128 -254 -252 -147
-126 -163 -160 -184 -222 -138 -063 -155 -147 -083 -205 -167 -114 -197 -166 -198 -346 -321 -215 -225 -224 -131
-069 -113 -131 -119 -145 -154 -146 -146 -146 -078 -078 -017 -078 -121 -101 -088 -134 -156 -190 -259 -261 -221 -167 -111
-051 -041 -120 -134 -116 -085 -067 -035 -013 -038 -053 -058 -100 -169 -097 -153 -173 -132 -169 -177 -089 -084
-039 -064 -046 -115 -097 -052 -027 -010 -032 -032 -054 -049 -079 -115 -117 -116 -139 -138 -101 -080 -081 -096 -098
-035 -048 -032 -026 -078 -081 -088 -074 -051 -077 -064 -081 -109 -071 -096 -099 -086 -134 -056 -052 -164 -066
-007 -075 -088 -039 -024 -065 -075 -071 -263 -078 -094 -049 -014 -009 -059 -108 -082 -073 -061 -030 -074 -125
1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
L M
PRG KAT FIELD LAYER 1 24 HOURS 00Z 12 MARCH 1965

[illegible]

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	
LJ021	+014	-052	-050	-008	-015	-018	-021	-003	+006	-012	-016	-016	+025	+011	-064	+012	+075	-046	-065	+024	+006	+013	
LJC20	-011	-007	-015	-039	-046	-040	-029	+031	+075	+018	-036	-046	+001	+056	+004	-009	-003	-094	-093	-030	-005	+076	
J019	+029	+010	-002	+055	+042	-026	-002	+032	+021	-011	-030	+009	+023	+007	+018	-009	-030	-019	+017	-036	-006	+024	
J018	+028	-015	-046	+018	+050	+012	+018	+036	+002	-024	-005	+044	+022	-045	+003	+016	-027	-019	+099	+102	-013	-047	
J017	-002	-006	-008	-008	-025	-007	+041	+029	+003	-012	-018	+010	+008	-009	-013	-016	-006	-049	-097	+048	+129	-005	-047
J016	+009	-020	+074	+005	-081	-048	+063	+021	-046	-024	-015	-024	+017	+05	-018	-102	-036	+051	+038	-004	-029	-017	
J015	+014	+001	-008	-023	-029	-044	+016	+043	+032	-014	-028	+031	+032	-015	-034	-005	+022	+088	+005	-067	-009	+040	
J014	+023	+045	-025	-049	+077	+053	-057	-021	+036	+033	+027	+077	+037	-134	-090	+098	+069	-055	-067	-047	+021	+013	
J013	+019	-030	-004	+071	+007	-038	-056	-100	+042	+007	+004	+054	+054	-015	-013	+042	-019	+003	+077	+044	-038	-081	
J012	-051	-063	+020	-008	-071	-030	+013	-082	+017	+034	-108	-054	+025	+073	+062	-074	-061	+065	+102	+056	-011	-041	
J011	-001	-016	-005	-04	+003	+084	+033	+034	+118	+159	-083	-064	+053	+14	-075	+025	+098	-121	-189	+069	+145	+022	
J009	-010	-07	-117	-015	+123	+020	-013	+027	+000	+060	-064	-124	+170	-060	-148	+113	+136	-169	-179	+062	+112	-003	
J008	-030	-137	-050	+041	-049	-056	+05	-061	-015	-082	-059	-114	+071	+035	-056	+022	-046	-042	-049	-044	-097	+016	
J007	-028	-024	+073	-023	-136	-112	-012	-087	-029	+087	+085	-003	-113	-103	+007	+005	-036	+013	-003	-100	-077	+019	
J006	+026	+079	+021	-071	+020	+020	-030	+006	+061	+033	+071	+027	+010	+031	+029	+025	+050	-005	-038	+031	-073		
J005	-011	-012	+035	-010	-048	+059	+068	-101	-023	+020	-056	-063	-029	-072	+044	+017	-122	-109	+049	-007	-037	+050	
J004	+010	-012	+021	-011	-082	+02	+005	-134	-052	+058	+040	+009	+003	-019	-021	+063	+060	-028	-060	-020	-013	+015	
J003	+001	+003	+003	+001	-001	+005	+011	-007	-025	-020	-002	+043	+043	+039	-011	-042	+032	+069	-001	-003	+027	-032	
J002	-006	+004	-004	-001	+032	-002	+044	+008	-032	-021	-009	-012	+014	+026	-054	-050	+031	+045	+028	-013	-016		
J001	+003	-003	+001	-001	-016	-002	-008	-016	-001	-022	+014	+017	-052	-005	+039	+040	+015	-036	+035	+017	-095	+015	
LJ000	+011	-011	-007	+003	+002	-004	-003	+011	+007	-007	+004	+006	-012	-002	-008	+007	+013	-045	+006	+020	-082	-023	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	
L																							
M																							

LAPLACIAN OF VORTICITY LAYER 2

PRG.

24 HOURS

00Z 12 MARCH 1965

1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 +029 +055 +056 +036 +036 +039 +024 +018 +014 +002 +009 +018 +014 +023 +017 +031 +034 +024 +014 +012 +009
 +014 +038 +052 +042 +028 +024 +039 +040 +021 +016 +013 +004 +011 +019 +015 +001 +003 +010 +033 +030 +012 +005
 1019 +005 +009 +015 +015 +007 +011 +005 +024 +032 +025 +008 +004 +007 +011 +016 +019 +020 +025 +026 +008 +012 +015
 1018 +006 +014 +017 +016 +012 +021 +029 +022 +014 +009 +008 +003 +009 +021 +036 +032 +015 +008 +010 +015
 1017 +005 +009 +015 +015 +007 +011 +005 +024 +032 +025 +008 +004 +007 +011 +016 +019 +020 +025 +026 +008 +012 +015
 1016 +004 +004 +009 +016 +006 +010 +023 +035 +027 +021 +012 +011 +009 +011 +009 +008 +012 +017 +022 +010 +012 +014
 1015 +013 +004 +014 +016 +008 +026 +058 +046 +010 +018 +020 +014 +012 +026 +019 +010 +028 +029 +016 +001 +012 +012
 1014 +013 +008 +012 +015 +032 +067 +067 +034 +025 +012 +034 +021 +011 +013 +021 +018 +035 +042 +021 +003 +015 +014
 1013 +019 +028 +028 +069 +068 +026 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011 +011
 1012 +038 +047 +050 +061 +046 +031 +045 +023 +006 +022 +022 +008 +021 +011 +004 +004 +013 +038 +056 +036 +017 +032
 1011 +059 +059 +075 +074 +049 +018 +016 +020 +017 +031 +037 +035 +029 +016 +019 +005 +019 +035 +058 +049 +009 +022
 1010 +089 +081 +058 +020 +042 +016 +019 +011 +029 +034 +048 +056 +054 +043 +013 +022 +019 +043 +046 +039 +025 +006
 1009 +091 +097 +078 +077 +053 +016 +028 +039 +036 +034 +046 +033 +048 +079 +058 +032 +026 +040 +037 +032 +031 +013
 1008 +073 +085 +094 +089 +071 +059 +047 +039 +033 +031 +018 +028 +067 +069 +046 +035 +030 +032 +034 +031 +014
 1007 +055 +067 +067 +043 +035 +045 +058 +045 +034 +022 +023 +027 +032 +032 +046 +042 +027 +028 +029 +031 +034 +028
 1006 +045 +047 +052 +036 +006 +032 +047 +017 +013 +022 +030 +024 +024 +033 +042 +024 +024 +025 +032 +045 +041
 1005 +039 +045 +056 +059 +026 +035 +030 +077 +020 +011 +031 +032 +029 +040 +038 +045 +038 +021 +026 +037 +048 +040
 1004 +025 +039 +052 +069 +062 +047 +036 +046 +038 +021 +030 +036 +045 +035 +046 +044 +033 +030 +028 +041 +051 +032
 1003 +010 +019 +034 +049 +065 +058 +041 +040 +010 +005 +018 +011 +005 +019 +048 +048 +020 +036 +040 +046 +047 +020
 1002 +003 +007 +015 +029 +037 +035 +027 +024 +03 +008 +020 +020 +028 +028 +037 +041 +037 +039 +048 +038 +029 +031
 1001 +003 +007 +010 +014 +013 +005 +011 +021 +042 +025 +006 +021 +026 +020 +007 +035 +046 +048 +046 +035 +019 +046
 1000 +017 +005 +004 +004 +004 +001 +002 +014 +035 +039 +021 +019 +012 +013 +018 +025 +041 +052 +038 +038 +053 +056
 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
 00Z 12 MARCH 1965
 24 HOURS
 PRG. 2
 LAYER 2
 VERT GRAD CF VT

L 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
-047 -138 -139 -081 -082 -088 -113 -107 -101 -085 -042 -034 -032 -013 -088 -011 +026 -112 -156 -084 -055 -056
LJ021
-099 -125 -150 -165 -146 -126 -136 -082 -034 -086 -099 -064 -021 +024 -019 -012 -013 -122 -202 -150 -065 +059
LJ020
-067 -124 -164 -051 -116 -078 -046 -076 -110 -098 -030 -033 -025 +003 -021 -064 -092 -143 -129 -024 +002
J019
-036 -126 -039 +018 -026 -009 -024 -098 -113 -060 -001 -030 -082 -016 +025 -093 -175 -045 +057 -025 -063
J018
-037 -044 -023 -048 -025 +027 +011 -069 -113 -096 -036 -038 -072 -070 -041 -016 -126 -270 -091 +109 -019 -063
J017
-006 -030 +064 +060 -107 -101 +006 -071 -130 -086 -060 -077 -052 -013 -044 -128 -156 -095 -041 -028 -042 -036
J016
+001 -005 -031 -021 -074 -105 -104 -060 -012 -058 -081 -024 -068 -101 -068 -118 -195 -007 -040 -081 -030 +014
J015
+002 +007 -075 -102 -001 -083 -194 -105 -018 +011 -023 +022 -057 -212 -141 +027 -008 -132 -121 -046 -014 -026
J014
-049 -129 -080 -009 -075 -165 -118 -142 -101 +008 -048 -026 +015 -064 +017 -053 -086 -013 -002 -092 -158
J013
-196 -197 -070 -047 -140 -078 -058 -132 -012 -020 -153 -064 -005 +026 +032 -084 -043 -028 -045 -066 -100 -177
J012
-288 -154 -095 -143 -045 +061 -003 -020 +062 -054 -183 -113 +033 -039 -018 +006 +083 -171 -413 -241 -021 -121
J011
-343 -282 -197 -039 +079 -019 -044 +004 -058 -070 -236 -250 +078 -094 -210 +056 +084 -225 -372 -296 -166 -185
J010
-421 -461 -256 -011 -122 -095 -005 -135 -157 -065 -309 -302 -053 -167 -229 -034 -151 -194 -153 -304 -425 -268
J009
-373 -419 -274 -279 -331 -188 -124 -242 -190 -061 -156 -273 -339 -367 -280 -234 -253 -231 -259 -388 -436 -288
J008
-215 -245 -313 -357 -250 -243 -322 -200 -005 -136 -115 -151 -261 -302 -201 -277 -225 -223 -332 -392 -334 -296
J007
-144 -162 -236 -270 -153 -150 -174 -064 -019 -123 -246 -134 -080 -188 -204 -309 -399 -265 -172 -304 -343 -228
J006
-105 -137 -135 -184 -190 -081 -004 -193 -101 -018 -195 -201 -69 -246 -160 -226 -447 -375 -195 -243 -287 -141
J005
-042 -003 -001 -137 -224 -113 -099 -254 -152 -019 -068 -119 -122 -169 -194 -140 -189 -295 -275 -223 -169 -100
J004
-019 -033 -057 -080 -108 -099 -077 -001 -053 -065 -055 -013 -016 -051 -143 -184 -107 -115 -182 -155 -089 -098
J003
-012 -005 -032 -044 -024 -042 -049 -004 -025 -057 -058 -037 -059 -043 -057 -153 -169 -075 -072 -063 -075 -077
J002
-002 -011 -011 -019 -032 -015 -042 -042 -050 -054 +001 -019 -087 -036 +015 -022 -064 -115 -040 -044 -135 -051
J001
-008 -017 -013 -022 -023 -026 -005 -002 -028 -047 -018 -016 -029 -020 -031 -026 -043 -115 -048 -034 -153 -092
LJ000
1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021
L M PRG KAT FIELD LAYER 2 24 HOURS 00Z 12 MARCH 1965

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+428	+480	+506	+454	+378	+354	+346	+310	+250	+164	+064	+996	+000	+012	+955	+904	+929	+979	+078	+277	+438	+476
LJ020	+510	+552	+560	+514	+453	+438	+445	+410	+337	+242	+098	+984	+012	+068	+018	+963	+987	+067	+200	+346	+420	+431
	888	888888	8888888	88888888	888888888	8888888888	88888888888	888888888888	8888888888888	88888888888888	888888888888888	8888888888888888	88888888888888888	888888888888888888	8888888888888888888	88888888888888888888	888888888888888888888	8888888888888888888888	88888888888888888888888	888888888888888888888888	8888888888888888888888888	88888888888888888888888888
J019	+580	+612	+624	+628	+607	+567	+550	+517	+437	+348	+226	+087	+043	+058	+026	+988	+020	+141	+302	+404	+419	+403
J018	+633	+669	+697	+733	+740	+699	+654	+608	+535	+449	+340	+203	+102	+055	+001	+975	+033	+171	+327	+410	+411	+382
J017	+676	+709	+739	+765	+770	+755	+714	+648	+570	+482	+373	+251	+159	+065	+947	+924	+037	+195	+325	+394	+400	+372
J016	+699	+717	+736	+749	+748	+734	+698	+635	+552	+455	+354	+262	+180	+057	+909	+898	+056	+223	+319	+371	+391	+393
J015	+711	+714	+711	+698	+687	+666	+624	+574	+511	+421	+331	+263	+176	+047	+947	+979	+114	+230	+292	+336	+380	+423
J014	+724	+713	+670	+600	+562	+561	+535	+488	+444	+391	+342	+305	+214	+075	+018	+080	+168	+218	+240	+279	+351	+431
J013	+719	+689	+611	+508	+456	+469	+472	+455	+396	+376	+365	+351	+284	+167	+101	+126	+177	+192	+182	+212	+305	+411
J012	+684	+544	+570	+487	+445	+451	+458	+438	+412	+388	+362	+339	+307	+236	+164	+153	+167	+153	+141	+177	+260	+368
J011	+642	+604	+549	+505	+473	+472	+471	+462	+449	+415	+353	+311	+298	+248	+184	+177	+171	+135	+136	+182	+248	+355
J010	+617	+578	+551	+520	+500	+494	+491	+486	+480	+455	+390	+328	+304	+273	+230	+210	+193	+170	+181	+227	+301	+416
J009	+622	+578	+555	+541	+533	+520	+515	+520	+516	+500	+463	+410	+364	+329	+303	+276	+255	+256	+275	+318	+395	+503
J008	+659	+616	+593	+502	+570	+553	+546	+551	+549	+545	+539	+524	+484	+431	+402	+386	+367	+371	+396	+430	+488	+577
J007	+707	+673	+654	+644	+629	+615	+608	+606	+608	+616	+627	+629	+604	+564	+538	+518	+497	+498	+518	+541	+582	+654
J006	+746	+721	+710	+706	+700	+696	+699	+703	+703	+704	+719	+720	+694	+671	+654	+631	+612	+612	+623	+637	+672	+729
J005	+774	+757	+751	+753	+753	+745	+769	+794	+782	+778	+790	+791	+769	+747	+737	+722	+706	+701	+706	+716	+743	+786
J004	+796	+785	+783	+784	+790	+793	+807	+825	+834	+837	+844	+842	+827	+814	+809	+798	+782	+775	+777	+783	+801	+829
J003	+811	+804	+805	+811	+816	+822	+837	+855	+868	+876	+879	+876	+868	+862	+857	+849	+839	+835	+834	+837	+847	+862
J002	+822	+818	+820	+827	+833	+841	+856	+873	+895	+892	+894	+893	+896	+879	+878	+876	+871	+867	+866	+869	+873	+879
J001	+829	+827	+829	+837	+844	+851	+864	+879	+850	+895	+895	+891	+882	+879	+884	+887	+882	+877	+879	+881	+881	+883
LJ000	+834	+833	+836	+842	+849	+855	+865	+877	+887	+891	+889	+880	+876	+880	+885	+885	+883	+881	+882	+882	+883	+886
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L	LOCKER	LEVEL	Z	FIELD	LAYER	1	PROG.	24	HOURS	12Z	12	MARCH	1965									

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	-050	+019	+091	+075	-054	+026	+064	-033	+028	+025	-012	-017	+029	-014	-031	+014	-022	-120	-046	+066	-005	
LJ020	+013	+031	+024	-064	-129	-036	+034	-002	+011	+032	-052	-116	+039	+112	-018	-026	+026	+015	+017	+047	-012	-036
J019	+025	+005	-046	-023	-036	-045	-002	+031	-043	-011	+003	-038	-041	+016	+033	88888888	+012	+090	+056	-022	-006	
J018	+009	+002	-031	+054	+103	-009	-020	+024	+020	+031	+055	+005	-040	+018	+028	+18	-039	-051	+020	+033	+005	-006
J017	+019	+018	+024	-007	-027	+026	+012	-016	+013	+035	+021	-011	+027	+047	-028	-036	004	010	-011	+022	+031	-035
J016	-003	-013	+005	+011	-031	-015	+032	+010	-016	-022	-026	-019	+051	+018	-074	-139	007	+075	006	-007	+004	-017
J015	-035	-045	+007	+048	+070	+030	+015	+048	+007	-055	-043	+000	+005	-040	-003	+030	+024	+008	+008	-005	+007	
J014	+019	+029	+053	-023	-071	+053	-013	-004	+024	-010	-032	+032	+026	-104	-056	+055	+060	-006	+003	007	+020	+029
J013	+008	+042	-015	-104	-129	-000	+015	-032	-074	-017	+035	+097	+074	-016	-022	-019	+002	+067	-013	-088	+036	+067
J012	+019	+035	-023	-036	-030	-015	+032	+004	-033	-007	+019	+002	+033	+057	-000	-019	+013	+016	-027	-018	+007	-020
J011	-056	-048	+043	+047	+004	+050	+030	+008	+049	+049	+030	-080	-081	+004	+106	+062	+111	-081	-028	+075	-066	-129
J010	-077	-044	+050	-007	-018	+003	-023	+007	+058	+044	-023	-082	+017	+012	-037	-004	+034	-042	-020	-004	-037	-003
J009	-056	-070	-054	-034	+017	-024	-030	+021	+009	+023	+033	-020	-074	-014	+000	-056	-097	005	003	-039	+025	+069
J008	+006	-057	-057	+026	+014	-058	-021	+023	-060	-025	+012	+034	+033	-051	-045	014	+004	-000	+009	+008	-050	-033
J007	+044	-012	+004	+047	+000	-014	-030	-036	-054	-030	+022	+031	+050	+050	+011	+034	+043	+016	+036	-014	-071	-005
J006	+009	+008	+022	+008	+023	+051	+031	+057	+036	-031	+026	+043	+021	+017	+036	+001	-038	+038	+041	-026	+007	+047
J005	+000	-015	-003	-000	+001	-016	+027	+048	+012	-025	-026	+041	+005	-040	+001	+031	-025	-034	+008	-011	-021	+017
J004	+021	-013	-042	+017	+018	-050	-053	-004	+008	-015	+017	+018	-016	+018	+026	+041	-020	-037	+022	-016	-058	+006
J003	+014	-007	-031	+040	+020	-065	-072	+041	+007	-035	+024	+016	-045	+005	+005	-026	-025	+038	+021	+001	+034	+022
J002	+000	-001	-000	+027	+002	-029	+022	+032	+003	-020	-009	+033	+027	+003	+008	+002	+011	+021	+008	+027	+028	+009
J001	-003	-015	-006	+006	+005	+003	+000	-001	+002	+003	+007	+021	+009	-042	-022	+042	+011	-030	+025	+020	-085	-059
LJ000	+037	-052	-018	+007	+004	-002	-010	+004	+002	+008	+022	-043	-069	-022	-008	+002	-009	-029	-010	-027	-039	-005
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
L	LAPLACIAN CF VERTICITY LAYER 1																					
L	PRCG. 24 HOURS 12Z 12 MARCH 1965																					

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+010	+009	+020	+040	+021	+013	+020	+005	+014	+025	+017	+011	+012	+017	+020	+013	+016	+009	+029	+039	+019	+010
LJ020	+014	+007	+019	+036	+029	+018	+024	+017	+016	+031	+034	+012	+027	+020	+018	+006	+010	+008	+029	+031	+015	+001
J019	+021	+021	+029	+045	+047	+056	+046	+03	+023	+025	+034	+025	+016	+018	+022	+024	+016	+023	+030	+020	+003	+009
J018	+028	+034	+041	+055	+058	+043	+025	+021	+021	+024	+023	+018	+012	+016	+033	+024	+017	+030	+035	+020	+003	+007
J017	+032	+036	+037	+044	+044	+022	+007	+007	+019	+027	+019	+007	+011	+028	+024	+017	+035	+042	+035	+016	+004	+007
J016	+026	+024	+022	+010	+040	+023	+008	+014	+018	+021	+021	+013	+017	+025	+016	+019	+047	+048	+028	+009	+009	+008
J015	+015	+007	+042	+073	+054	+034	+022	+022	+018	+020	+022	+022	+028	+028	+002	+032	+049	+044	+021	+002	+008	+009
J014	+006	+038	+062	+074	+073	+051	+033	+031	+028	+009	+016	+028	+035	+029	+017	+038	+046	+035	+020	+017	+011	+006
J013	+028	+49	+063	+040	+015	+025	+016	+018	+019	+021	+004	+027	+037	+035	+026	+034	+040	+025	+025	+024	+024	+015
J012	+036	+035	+037	+056	+040	+027	+011	+010	+017	+018	+016	+014	+022	+022	+022	+026	+025	+033	+037	+026	+023	+024
J011	+041	+024	+010	+013	+032	+043	+036	+020	+028	+011	+014	+019	+040	+038	+019	+016	+011	+022	+020	+024	+024	+028
J010	+048	+024	+029	+038	+026	+008	+012	+027	+026	+029	+026	+039	+058	+014	+055	+023	+015	+013	+017	+030	+033	+041
J009	+070	+041	+032	+023	+034	+044	+027	+012	+004	+026	+047	+064	+096	+095	+000	+031	+014	+016	+071	+030	+042	+053
J008	+095	+059	+045	+054	+031	+015	+033	+022	+013	+024	+048	+073	+102	+112	+110	+067	+024	+018	+027	+031	+045	+059
J007	+094	+083	+069	+080	+094	+077	+060	+042	+031	+046	+083	+057	+055	+085	+108	+073	+045	+044	+042	+056	+067	
J006	+065	+085	+077	+067	+091	+119	+084	+063	+092	+093	+053	+037	+051	+036	+049	+077	+091	+071	+065	+069	+079	+076
J005	+060	+65	+061	+063	+069	+065	+069	+074	+089	+071	+053	+038	+051	+062	+059	+089	+084	+087	+095	+087	+070	
J004	+074	+068	+054	+067	+047	+016	+048	+083	+056	+023	+042	+059	+064	+076	+057	+051	+072	+090	+103	+104	+092	+072
J003	+063	+078	+075	+069	+059	+020	+065	+068	+044	+030	+045	+054	+034	+047	+055	+054	+065	+096	+109	+103	+102	+087
J002	+041	+062	+080	+079	+093	+074	+088	+053	+028	+042	+056	+034	+014	+033	+069	+074	+102	+134	+115	+095	+096	+099
J001	+026	+034	+046	+054	+087	+117	+093	+036	+023	+038	+062	+075	+050	+057	+062	+089	+125	+126	+111	+091	+074	+060
LJ000	+006	+012	+025	+026	+044	+072	+055	+043	+040	+043	+068	+031	+049	+028	+046	+077	+084	+061	+068	+080	+053	+068
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
M	VERY GRAD	CF	VT																			

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L	1009	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+042	+028	+045	+032	+076	+028	+027	+031	+034	+018	+004	+001	+011	+012	+003	+009	+030	+081	+099	+035	+011	
LJ020	+049	+036	+031	+066	+077	+056	+049	+050	+048	+061	+052	+009	+002	+012	+011	+004	+018	+060	+096	+048	+006	+007
J019	+037	+032	+036	+079	+116	+086	+054	+054	+063	+075	+084	+042	+075	+001	+004	+000	+024	+077	+068	+013	+000	+004
J018	+028	+027	+032	+034	+041	+045	+035	+031	+044	+060	+075	+039	+022	+008	+008	+002	+031	+080	+059	+008	+002	+004
J017	+016	+013	+009	+002	+001	+006	+013	+019	+028	+041	+053	+041	+030	+031	+017	+008	+060	+079	+044	+008	+001	+003
J016	+006	+004	+003	+004	+008	+012	+020	+030	+040	+050	+042	+027	+032	+050	+015	+024	+097	+068	+024	+007	+000	+005
J015	+003	+000	+009	+037	+031	+036	+034	+047	+042	+043	+031	+026	+039	+040	+012	+055	+074	+036	+018	+014	+007	+013
J014	+001	+007	+045	+091	+097	+073	+083	+042	+029	+015	+011	+027	+062	+048	+018	+040	+028	+013	+020	+033	+033	+030
J013	+006	+042	+096	+084	+040	+025	+013	+011	+005	+001	+001	+017	+047	+058	+017	+011	+011	+010	+018	+040	+075	+076
J012	+033	+063	+074	+045	+000	+000	+001	+006	+011	+006	+005	+008	+017	+035	+014	+005	+001	+006	+009	+028	+071	+116
J011	+058	+027	+010	+003	+002	+007	+019	+030	+023	+006	+008	+026	+016	+008	+003	+001	+008	+008	+008	+059	+138	
J010	+084	+038	+021	+017	+013	+005	+004	+004	+011	+036	+060	+042	+026	+039	+046	+023	+015	+027	+044	+069	+134	+210
J009	+120	+065	+032	+035	+038	+025	+018	+013	+011	+030	+079	+116	+102	+088	+100	+094	+087	+109	+124	+141	+196	+232
J008	+138	+115	+091	+091	+090	+081	+081	+049	+043	+056	+098	+153	+182	+171	+190	+199	+197	+192	+180	+197	+220	
J007	+108	+122	+115	+109	+117	+133	+100	+124	+114	+045	+046	+134	+100	+198	+201	+199	+203	+197	+184	+205	+206	
J006	+064	+077	+078	+077	+086	+102	+018	+130	+127	+008	+093	+092	+102	+018	+100	+115	+117	+112	+118	+123	+119	+096
J005	+038	+044	+044	+047	+048	+044	+055	+067	+074	+073	+063	+058	+071	+058	+064	+070	+084	+093	+091	+089	+080	+058
J004	+022	+028	+029	+032	+030	+026	+033	+037	+040	+043	+039	+035	+034	+058	+064	+070	+084	+093	+091	+089	+080	+058
J003	+012	+017	+020	+021	+021	+024	+031	+027	+023	+022	+018	+018	+024	+028	+030	+037	+050	+055	+049	+040	+025	
J002	+005	+008	+011	+011	+013	+015	+020	+013	+010	+009	+006	+005	+008	+008	+009	+016	+021	+019	+018	+015	+009	+007
J001	+002	+003	+005	+005	+006	+005	+008	+005	+003	+002	+001	+001	+001	+001	+002	+004	+005	+004	+004	+003	+003	+004
LJ000	+001	+001	+002	+002	+002	+003	+003	+002	+001	+000	+001	+002	+003	+001	+001	+001	+001	+002	+001	+002	+004	+004
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021

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24 HOURS

PROG.

LAYER1

KINETIC ENERGY

12Z 12 MARCH 1965

24 HOURS

LAYER 1

KINETIC ENERGY

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	-102	-032	+044	-080	-107	-014	-044	-066	-018	-033	-047	-026	+003	+001	-046	-047	+001	-061	-221	-185	+012	-026
LJ020	-050	-012	-025	-166	-235	-109	-039	-068	-053	-060	-139	-137	-020	+090	-010	-037	-002	-053	-109	-031	-032	-044
J019	-033	-048	-112	-099	-127	-185	-098	-055	-129	-118	-105	-106	-061	-003	+007	-030	-077	-088	-009	+022	-025	-018
J018	-046	-055	-108	-035	+034	-082	-080	-027	-045	-053	-043	-073	-075	-032	-013	-008	-087	-160	-074	+005	+001	-017
J017	-029	-031	-023	-053	-073	-302	-009	-045	-034	-035	-051	-059	-014	-011	-069	-003	-090	-031	-091	-002	+026	-044
J016	-034	-042	-020	-003	-079	-050	+005	-034	-074	-093	-089	-051	+002	-011	-105	-182	-187	-042	-046	-023	-004	-030
J015	-052	-052	-057	-062	-035	-054	-087	-054	-011	-056	-108	-091	-067	-063	-054	-128	-093	-056	-031	-004	-019	-014
J014	+012	-016	-005	-194	-191	-070	-099	-118	-034	-015	-061	-021	-010	-006	-003	-036	-069	-023	-023	-073	-072	-087
J013	+034	-009	-144	-228	-137	-090	-014	-068	-099	-050	+030	+061	-011	-109	-065	-060	-049	+033	-056	-155	-063	-025
J012	-051	-063	-134	-037	-030	-041	+021	-012	-061	-027	-010	-020	-006	-003	-036	-069	-023	-023	-073	-072	-087	-161
J011	-155	-089	+022	+002	-038	+005	-008	-028	+012	-012	-118	-104	-000	-061	-140	+036	+098	-105	-056	+023	-150	-295
J010	-210	-106	+006	-062	-060	-000	-039	-021	+021	-022	-109	-162	-071	-002	-130	-047	+004	-082	-001	-103	-204	-254
J009	-247	-177	-119	-094	-055	-093	-075	-004	-005	-033	-087	-203	-272	-197	-000	-181	-197	-121	-148	-210	-214	-215
J008	-226	-235	-193	-119	-186	-154	-118	-094	-116	-105	-158	-192	-252	-352	-326	-243	-219	-225	-210	-203	-292	-312
J007	-158	-208	-181	-142	-191	-226	-200	-202	-204	-14	-07	-163	-150	-150	-194	-275	-229	-232	-205	-241	-332	-278
J006	-121	-155	-132	-131	-154	-169	-182	-136	-183	-232	-121	-001	-173	-173	-160	-234	-279	-182	-178	-256	-248	-182
J005	-097	-124	-104	-119	-113	-094	-098	-098	-131	-170	-142	-054	-117	-24	-161	-134	-231	-230	-202	-229	-227	-150
J004	-076	-115	-124	-081	-059	-092	-134	-124	-104	-080	-064	-076	-124	-150	-054	-081	-177	-219	-173	-209	-230	-124

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+891	+894	+895	+886	+876	+875	+872	+868	+859	+847	+840	+837	+834	+827	+823	+827	+836	+851	+874	+893	+898	
LJ020	+902	+904	+904	+896	+888	+887	+889	+886	+879	+867	+850	+839	+839	+834	+828	+834	+848	+866	+883	+890	+891	
	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	
J019	+912	+914	+915	+915	+911	+907	+906	+902	+892	+878	+861	+846	+841	+841	+837	+832	+837	+856	+877	+890	+887	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J018	+920	+924	+927	+930	+930	+925	+921	+916	+906	+893	+875	+857	+847	+841	+834	+831	+837	+855	+878	+890	+884	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J017	+926	+930	+934	+936	+935	+933	+927	+920	+911	+898	+881	+864	+854	+843	+830	+828	+841	+860	+877	+889	+884	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J016	+929	+932	+936	+937	+934	+931	+926	+918	+908	+894	+877	+865	+856	+843	+829	+829	+847	+867	+880	+887	+888	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J015	+930	+932	+932	+931	+928	+923	+917	+910	+899	+876	+866	+856	+843	+833	+838	+855	+870	+879	+886	+890	+893	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J014	+933	+932	+927	+913	+912	+905	+903	+896	+892	+885	+878	+873	+862	+847	+840	+848	+860	+869	+875	+881	+890	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J013	+933	+929	+910	+906	+897	+894	+893	+886	+884	+882	+881	+879	+870	+855	+847	+850	+858	+865	+867	+872	+884	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J012	+930	+923	+918	+902	+894	+892	+892	+890	+886	+883	+879	+876	+870	+860	+852	+852	+856	+858	+860	+866	+877	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J011	+926	+916	+911	+902	+896	+895	+895	+894	+888	+888	+888	+888	+888	+888	+888	+888	+888	+888	+888	+888	+888	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J010	+926	+915	+903	+902	+898	+896	+896	+896	+895	+895	+895	+895	+895	+895	+895	+895	+895	+895	+895	+895	+896	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J009	+929	+918	+911	+907	+903	+901	+900	+902	+903	+902	+902	+898	+893	+888	+884	+878	+873	+870	+871	+874	+881	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J008	+936	+926	+920	+918	+915	+912	+910	+909	+909	+911	+912	+911	+907	+901	+896	+892	+891	+890	+892	+896	+905	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J007	+945	+937	+933	+931	+930	+927	+925	+924	+923	+925	+928	+928	+926	+920	+915	+913	+912	+911	+911	+913	+920	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J006	+951	+946	+943	+942	+941	+940	+939	+939	+938	+941	+942	+939	+934	+931	+929	+927	+927	+927	+929	+934	+943	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J005	+956	+952	+950	+949	+949	+948	+948	+949	+949	+949	+950	+951	+948	+945	+944	+943	+940	+935	+940	+941	+945	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J004	+959	+956	+955	+954	+954	+953	+955	+956	+956	+957	+957	+955	+953	+953	+952	+950	+949	+950	+951	+954	+958	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J003	+961	+960	+959	+959	+958	+957	+958	+960	+961	+961	+962	+962	+960	+959	+959	+958	+957	+957	+958	+959	+960	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J002	+963	+962	+962	+962	+962	+961	+963	+964	+965	+965	+965	+965	+964	+963	+963	+963	+963	+963	+963	+963	+965	
	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	
J001	+964	+964	+964	+964	+964	+965	+965	+966	+967	+967	+967	+967	+966	+965	+965	+966	+966	+965	+965	+965	+964	
LJ000	+964	+964	+965	+965	+966	+966	+967	+967	+968	+968	+968	+967	+966	+966	+967	+967	+967	+967	+966	+966	+967	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	
	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	12Z	

L	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321
LJ021	-058	-035	-055	-046	-041	-037	-005	-050	-049	-049	-046	-041	-037	-033	-012	-025	-047	-041	-046	-047	-062	-042
LJ020	+024	+050	-033	-046	-137	-026	+005	+011	+054	+010	-044	-041	+031	+67	+005	-041	+026	+053	+042	+043	-028	-044
JC19	+026	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	
J018	-012	+006	+051	+050	+029	-002	-002	-002	+016	+065	+046	-035	-035	+038	+032	+027	-056	-080	+014	+046	+018	-024
J017	+011	+026	+029	+029	+033	+008	+008	+008	+026	+075	+052	+015	+019	+014	-017	-000	+030	-033	-033	+055	+047	-047
J016	-033	+016	+033	-021	-021	+022	+028	+028	-002	-058	-056	+017	+051	+33	-066	-121	+015	+070	-001	-011	-001	-000
J015	-038	-055	+003	+053	+035	+037	+001	+025	+045	-015	-076	-053	+038	+020	-052	-003	+034	+028	-002	-002	-014	-009
J014	+022	+016	+052	+017	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	+055	
J013	+076	+056	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	+015	
J012	+031	+017	-044	-012	-035	-055	+039	+054	-044	-044	-044	-044	+003	+043	+014	-028	-029	-006	-026	-031	+028	-018
J011	-052	-031	+046	+027	+012	+045	+045	+045	+019	+094	+035	-133	-092	+051	+13	-145	+079	+169	-058	+005	+103	-107
J010	-091	-070	+065	+013	-011	+028	-066	+021	+114	+135	-022	-067	+034	+105	-047	-042	-070	-018	-004	-034	-051	+046
J009	-057	-111	-039	-033	-040	-035	+002	-027	-044	+018	+027	-036	-062	+029	+089	-078	-156	-032	-025	-060	+031	+094
J008	+035	-095	-086	+069	+088	-064	+016	-060	-118	-008	+021	-021	-020	-075	-000	+032	+062	+005	-018	-000	-076	-059
J007	+065	-006	-033	+51	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	+001	
J006	+001	+037	+053	+001	+026	+067	+031	+069	+069	+069	+069	+069	+069	+069	+069	+069	+069	+069	+069	+069	+069	
J005	-005	-005	-011	-025	-010	+056	+029	-027	-009	-027	-027	-027	+018	+033	-051	+046	+087	-023	-059	+015	+008	-024
J004	+041	-030	-057	+003	+030	-074	-044	-015	-029	-007	+045	+032	+070	-022	-012	+034	+009	-030	+026	-006	-075	-000
J003	+079	+001	-063	+059	+026	-115	-033	+082	-024	-053	-015	+03	-031	-063	-007	-024	-049	+023	+020	+013	+055	+014
J002	-009	+12	+021	+031	+030	-014	+026	+041	+015	-050	-03	+042	+042	+011	+038	+015	+026	+044	+043	+022	-009	-009
J001	+004	-008	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	+004	
LJ000	+001	-028	-008	+005	+005	-004	-003	+031	+031	+031	+031	+031	+031	+031	+031	+031	+031	+031	+031	+031	+031	
L	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321
L	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321
L	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321

122 12 MARC 1965

24 HOUR

PRCG.

12Z 12 MARCH 1965

24 HOUR

PRG.

LAPLACIAN OF VORTICITY LAYER 2

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	
LJ021	+005	+016	+032	+062	+045	+027	+028	+018	+019	+029	+026	+001	+008	+012	+022	+015	+015	+026	+014	+009	+016	+023	
LJ020	+007	+005	+024	+043	+053	+040	+038	+041	+027	+022	+012	+021	+017	+018	+015	+007	+020	+019	+009	+009	+016		
J019	+006	+016	+018	+021	+046	+029	+025	+042	+037	+015	+009	+019	+013	+016	+008	+019	+018	+017	+015	+001	+012	+012	
J018	+007	+017	+007	+019	+021	+024	+016	+018	+031	+027	+021	+013	+004	+011	+013	+014	+014	+014	+014	+005	+007	+010	
J017	+008	+007	+012	+005	+007	+013	+011	+014	+022	+030	+028	+013	+011	+013	+012	+015	+016	+012	+011	+008	+009	+011	
J016	+012	+004	+006	+006	+011	+007	+027	+038	+023	+025	+038	+012	+017	+019	+018	+022	+014	+010	+016	+015	+016	+019	
J015	+009	+008	+002	+003	+007	+038	+056	+043	+026	+026	+029	+016	+021	+026	+023	+009	+006	+012	+020	+011	+014	+024	
J014	+022	+014	+011	+029	+040	+057	+060	+028	+017	+009	+013	+017	+012	+012	+029	+035	+030	+025	+029	+025	+007	+015	
J013	+018	+013	+036	+048	+046	+044	+022	+017	+053	+016	+010	+024	+021	+018	+025	+035	+035	+035	+037	+041	+029	+010	
J012	+023	+039	+048	+053	+037	+009	+037	+032	+015	+027	+021	+021	+021	+021	+046	+014	+012	+017	+033	+037	+041	+035	+025
J011	+040	+041	+055	+057	+045	+047	+020	+014	+020	+027	+039	+024	+038	+046	+018	+013	+008	+019	+043	+037	+022	+029	
J010	+071	+057	+055	+042	+022	+032	+060	+018	+004	+015	+028	+042	+057	+049	+071	+023	+010	+018	+048	+035	+011	+023	
J009	+081	+074	+052	+067	+081	+071	+035	+041	+016	+005	+018	+034	+020	+037	+050	+064	+027	+044	+049	+032	+017	+025	
J008	+068	+076	+071	+063	+089	+123	+097	+045	+034	+039	+048	+044	+032	+032	+048	+043	+063	+056	+041	+031	+030	+041	
J007	+056	+065	+063	+050	+054	+067	+069	+077	+060	+047	+054	+057	+049	+048	+038	+024	+041	+044	+035	+037	+044	+047	
J006	+048	+051	+050	+041	+024	+007	+037	+005	+043	+013	+029	+040	+032	+032	+024	+044	+038	+018	+018	+029	+037	+041	+040
J005	+033	+042	+039	+034	+020	+016	+008	+009	+006	+010	+029	+005	+021	+001	+028	+043	+023	+010	+033	+033	+037	+040	
J004	+020	+032	+035	+023	+030	+026	+011	+013	+027	+023	+038	+021	+020	+019	+027	+036	+034	+046	+042	+033	+042	+040	
J003	+013	+025	+033	+025	+038	+042	+044	+034	+043	+045	+043	+038	+047	+03	+015	+034	+046	+051	+037	+031	+030	+027	
J002	+007	+015	+025	+027	+032	+044	+043	+030	+045	+054	+027	+024	+056	+014	+008	+029	+040	+017	+010	+006	+027	+047	
J001	+008	+003	+012	+015	+018	+022	+019	+018	+023	+031	+012	+005	+024	+039	+010	+024	+017	+008	+010	+027	+015	+046	
LJ000	+015	+013	+003	+006	+008	+005	+008	+006	+005	+012	+020	+017	+021	+024	+031	+016	+019	+020	+011	+013	+039	+058	
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	

12Z 12 MARCH 1965

24 HOURS

PRUG.

LAYER ?

VERT GRAU CF VT

L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
LJ021	+062	+066	+047	+035	+032	+036	+040	+038	+039	+041	+026	+011	+011	+016	+008	+001	+013	+052	+096	+090	+035	+013
LJ020	+075	+078	+073	+046	+045	+065	+059	+055	+049	+065	+042	+009	+004	+014	+013	+003	+034	+087	+094	+036	+006	+011
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J019	+059	+067	+084	+113	+129	+092	+063	+056	+073	+097	+076	+028	+006	+005	+008	+002	+037	+096	+064	+009	+000	+005
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J018	+041	+050	+053	+046	+044	+047	+038	+035	+054	+089	+152	+062	+023	+011	+007	+000	+031	+091	+072	+009	+003	+004
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J017	+022	+022	+013	+005	+003	+006	+013	+019	+030	+055	+067	+053	+041	+032	+011	+004	+050	+081	+056	+011	+002	+004
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J016	+008	+008	+003	+002	+009	+013	+018	+031	+055	+069	+046	+029	+040	+050	+013	+021	+087	+068	+027	+010	+001	+009
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J015	+005	+001	+008	+034	+048	+045	+047	+053	+056	+053	+034	+024	+038	+043	+018	+052	+073	+036	+015	+012	+009	+023
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J014	+003	+005	+039	+085	+088	+070	+055	+048	+032	+016	+018	+032	+056	+046	+017	+034	+029	+015	+014	+025	+036	+043
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J013	+009	+043	+067	+088	+084	+035	+019	+015	+007	+002	+002	+013	+009	+051	+011	+008	+013	+013	+017	+038	+085	+103
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J012	+052	+080	+073	+051	+017	+001	+000	+036	+016	+011	+008	+009	+024	+043	+012	+008	+005	+003	+010	+026	+076	+170
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J011	+115	+077	+048	+034	+015	+005	+002	+008	+025	+046	+033	+009	+018	+030	+015	+005	+002	+009	+019	+060	+189	
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J010	+186	+084	+040	+036	+029	+018	+012	+015	+012	+050	+082	+083	+048	+083	+097	+001	+020	+033	+008	+066	+180	+307
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J009	+255	+149	+078	+091	+094	+070	+050	+033	+005	+056	+122	+154	+125	+120	+158	+163	+156	+164	+154	+179	+286	+360
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J008	+263	+240	+176	+182	+199	+176	+146	+130	+114	+119	+165	+224	+239	+215	+216	+281	+339	+334	+297	+265	+305	+363
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J007	+184	+230	+211	+187	+206	+238	+214	+215	+206	+174	+171	+201	+239	+264	+275	+286	+287	+310	+323	+303	+342	+346
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J006	+107	+133	+134	+118	+122	+148	+169	+156	+159	+153	+135	+145	+152	+165	+235	+237	+198	+201	+241	+272	+292	+245
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J005	+059	+069	+065	+068	+064	+059	+070	+087	+089	+098	+095	+088	+095	+110	+134	+149	+148	+145	+167	+189	+178	+142
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J004	+036	+048	+042	+051	+046	+037	+048	+064	+061	+052	+050	+050	+058	+066	+070	+074	+092	+109	+115	+118	+108	+080
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J003	+018	+032	+040	+040	+040	+044	+052	+049	+039	+029	+023	+026	+037	+045	+047	+047	+046	+065	+061	+050	+035	
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J002	+007	+014	+022	+021	+026	+037	+033	+022	+019	+019	+014	+011	+019	+027	+028	+030	+032	+026	+019	+015	+013	+016
	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
J001	+002	+004	+007	+008	+011	+015	+012	+007	+007	+009	+005	+001	+003	+007	+010	+012	+013	+009	+006	+005	+010	+015
LJ000	+005	+001	+001	+002	+003	+003	+003	+001	+001	+001	+002	+001	+000	+002	+005	+007	+008	+009	+009	+012	+017	+012
L	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021
KINETIC ENERGY																						
LAYER 2																						
12Z 12 MARCH 1965																						

TABLE 1

AIRCRAFT TURBULENCE CRITERIA

<u>CATEGORY</u>	<u>DEFINITION</u>
LIGHT	A turbulent condition during which occupants may be required to use seat belts, but objects in the aircraft remain at rest.
MODERATE	A turbulent condition in which occupants require seat belts and occasionally are thrown against the belt. Unsecured objects in aircraft move about.
SEVERE	A turbulent condition in which the aircraft momentarily may be out of control. Occupants are thrown violently against the belt and back into the seat. Objects not secured in the aircraft are tossed about.
EXTREME	A rarely encountered turbulent condition in which the aircraft is violently tossed about, and is practically impossible to control. May cause structural damage to the aircraft.

FIELDS	DATE	TIME	LAYER	TOTAL # OF OCCR	% CORR	L to M		M		M to S		S	
						# OCCR	# CORR	# OCCR	# CORR	# OCCR	# CORR	# OCCR	# CORR
LAPLACIAN OF VORTICITY	10 MAR 65	00Z	I	19	79	11	7	6	5	2	1	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	63	11	8	6	4	2	0	0	0
KINETIC ENERGY	"	"	"	"	26	11	3	6	2	2	0	0	0
KAT FIELD	"	"	"	"	32	11	5	6	1	2	0	0	0
LAPLACIAN OF VORTICITY	10 MAR 65	"	II	42	67	22	16	16	8	4	4	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	90	22	22	16	12	4	4	0	0
KINETIC ENERGY	"	"	"	"	85	22	19	16	13	4	4	0	0
KAT FIELD	"	"	"	"	76	22	17	16	12	4	3	0	0
LAPLACIAN OF VORTICITY	10 MAR 65	12Z	I	14	71	6	5	5	5	3	0	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	57	6	3	5	2	3	3	0	0
KINETIC ENERGY	"	"	"	"	93	6	6	5	5	3	2	0	0
KAT FIELD	"	"	"	"	71	6	6	5	4	3	0	0	0
LAPLACIAN OF VORTICITY	10 MAR 65	"	II	21	71	15	9	6	6	0	0	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	90	15	13	6	6	0	0	0	0
KINETIC ENERGY	"	"	"	"	90	15	13	6	6	0	0	0	0
KAT FIELD	"	"	"	"	90	15	13	6	6	0	0	0	0

TABLE 2

FIELDS	DATE	TIME	LAYER	TOTAL # OF OCCR	% CORR	L to M		M		M to S		S	
						OCCR	CORR	OCCR	CORR	OCCR	CORR	OCCR	CORR
LAPLACIAN OF VORTICITY	11 MAR 65	00Z	I	40	68	21	10	13	11	5	5	1	1
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	100	21	21	13	13	5	5	1	1
KINETIC ENERGY	"	"	"	"	67	21	15	13	5	5	4	1	0
KAT FIELD	"	"	"	"	63	21	9	13	9	5	5	1	1
LAPLACIAN OF VORTICITY	11 MAR 65	00Z	II	51	71	31	21	16	11	4	4	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	98	31	30	16	16	4	4	0	0
KINETIC ENERGY	"	"	"	"	88	31	29	16	12	4	4	0	0
KAT FIELD	"	"	"	"	82	31	25	16	13	4	4	0	0
LAPLACIAN OF VORTICITY	11 MAR 65	12Z	I	22	77	14	9	6	6	1	1	1	1
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	86	14	11	6	6	1	1	1	1
KINETIC ENERGY	"	"	"	"	64	14	10	6	4	1	0	1	0
KAT FIELD	"	"	"	"	50	14	8	6	6	1	0	1	0
LAPLACIAN OF VORTICITY	11 MAR 65	12Z	II	5	60	3	3	2	0	0	0	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	80	3	2	2	0	0	0	0	0
KINETIC ENERGY	"	"	"	"	60	3	2	2	1	0	0	0	0
KAT FIELD	"	"	"	"	40	3	1	2	1	0	0	0	0

TABLE 3

FIELDS	DATE	TIME	LAYER	TOTAL # OF OCCR	%	L to M		M		M to S		S	
						OCCR	CORR	OCCR	CORR	OCCR	CORR	OCCR	CORR
LAPLACIAN OF VORTICITY	12 MAR 65	00Z	I	27	52	11	7	11	6	2	1	3	1
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	92	11	10	11	10	2	2	3	3
KINETIC ENERGY	"	"	"	"	70	11	6	11	10	2	1	3	1
KAT FIELD	"	"	"	"	59	11	7	11	7	2	1	3	1
LAPLACIAN OF VORTICITY	12 MAR 65	00Z	II	19	53	4	2	9	5	5	2	1	1
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	89	4	3	9	8	5	5	1	1
KINETIC ENERGY	"	"	"	"	63	4	1	9	5	5	5	1	1
KAT FIELD	"	"	"	"	48	4	2	9	5	5	2	1	1
LAPLACIAN OF VORTICITY	12 MAR 65	12Z	I	26	77	15	10	11	8	0	0	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	100	15	15	11	11	0	0	0	0
KINETIC ENERGY	"	"	"	"	88	15	13	11	10	0	0	0	0
KAT FIELD	"	"	"	"	92	15	14	11	10	0	0	0	0
LAPLACIAN OF VORTICITY	12 MAR 65	12Z	II	16	81	12	9	2	2	2	2	0	0
VERTICAL GRADIENT OF THERMAL WIND	"	"	"	"	94	12	11	2	2	2	2	0	0
KINETIC ENERGY	"	"	"	"	94	12	11	2	2	2	2	0	0
KAT FIELD	"	"	"	"	87	12	11	2	1	2	2	0	0

TABLE 4

	All Categories	LIGHT TO MODERATE	MODERATE	MODERATE TO SEVERE	SEVERE
TOTAL NUMBER OF KAT OCCURRENCES	302	165	103	28	6
(10 MARCH 1965 TO 12 MARCH 1965)					
PERCENT CORRELATION (BY FIELD AND CATEGORY)					
LAPLACIAN OF VORTICITY		65	71	71	67
VERTICAL GRADIENT OF THERMAL WIND		90	89	93	100
KINETIC ENERGY		70	76	78	33
KAT FIELD		72	70	60	50
PERCENT CORRELATION (BY FIELD)					
LAPLACIAN OF VORTICITY	68				
VERTICAL GRADIENT OF THERMAL WIND	90				
KINETIC ENERGY	76				
KAT FIELD	70				

TABLE 5

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13. ABSTRACT There is much disagreement as to (a) what causes clear air turbulence (turbulence which is not in or near convective clouds and is above 15,000 feet in altitude) and (b) which meteorological parameters can be used to detect and forecast its occurrence. The approach to this problem has been to relate not one parameter to clear air turbulence but various parameters. By summing these parameters areas can be defined where there is a high probability of encountering clear air turbulence. Each parameter has been based on a statistical study which found a relationship with clear air turbulence. The parameters used were horizontal and vertical shear, curvature, kinetic energy and their derivatives. The numerical forecasting program proposed here can be extended to the stratosphere when more reliable height and temperature fields are available. This program will have much more significance when intermediate forecast height fields, temperature fields and a grid of much smaller mesh length are available.			

14.

KEY WORDS

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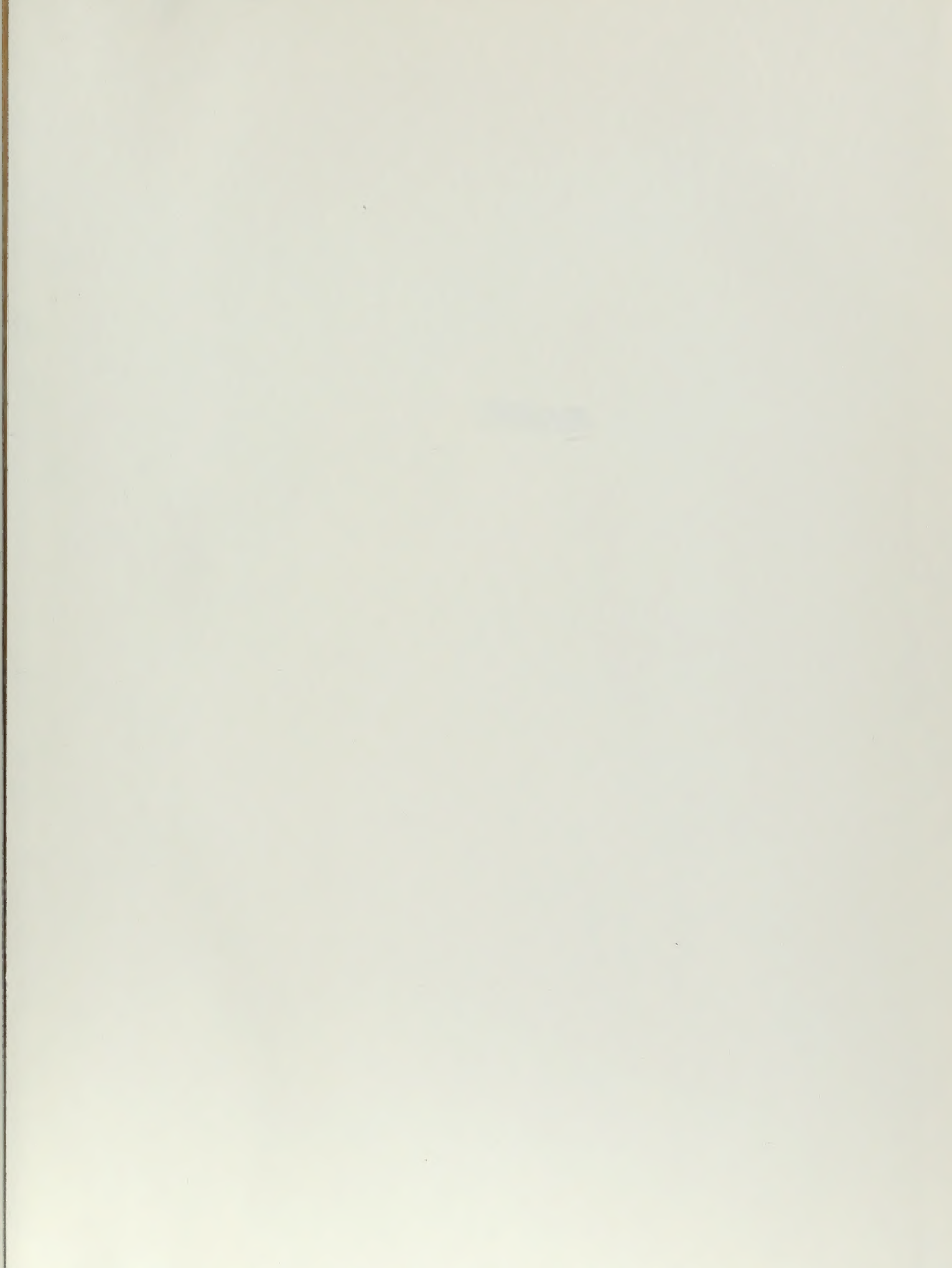
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Clear Air Turbulence



1



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